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AVIATION OF THE RED ARMY

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A brief encyclopedia of aircraft developed in the USSR on the eve and during World War II and in service with the Red Army presents aircraft projects (including twin-boom and twin-fuselage “tailless” and “flying wings”), projectiles, composite airplanes, helicopters, gyroplanes, gliders, convertiplanes, ring-wings, hovercraft, cruise missiles, etc. The article considers vehicles that were built serially or in pilot batches and took part in combat operations or auxiliary operations. It also tells about prototype aircraft, the planned production of which was interrupted by the end of the war, machines that for one reason or another were not mass-produced, captured aircraft received under Lend-Lease and licensed aircraft that were accepted. into armament.

The book contains the main characteristics of aircraft and information about the combat operations in which they were used. The book is provided with a large amount of illustrative material and is intended for a wide range of readers.

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AVIATION OF THE RED ARMY

INTRODUCTION

Late 20s - early 30s. were marked by the accelerated development of aviation in the advanced countries of the world. Biplane aircraft began to be replaced by monoplane aircraft. The improvement of aircraft designs led to the appearance of a retractable landing gear in flight, the aerodynamic shape of the fuselage improved, closed cockpits appeared, and fabric sheathing began to be replaced by duralumin. In England, France, the USA, Germany, Italy and other countries, many types of aircraft for various purposes were developed, some types were produced in large series. |

The qualitative and quantitative changes that took place in world aviation in the 1930s did not bypass the Air Force of the Workers 'and Peasants' Red Army (Air Force of the Red Army)

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THE USSR. The book offered to the reader considers aircraft developed on the eve and during the Second World War. Much attention is paid to the consideration of aircraft projects, such as airplanes (including twin-boom and twin-body aircraft, “tailless” and “flying wings”), projectile aircraft, composite aircraft, helicopters, gyroplanes, gliders, convertiplanes. , ring-planes, air-cushion vehicles, cruise missiles, etc. We consider vehicles that were built serially or in experimental batches and took part in one capacity or another in combat operations or auxiliary operations. The composition of these devices also includes experimental machines, whose planned production was interrupted by the end of the war, machines

ny, which for one reason or another were not accepted into mass production, aircraft received under Lend-Lease, captured aircraft and aircraft of licensed construction, adopted for service. The main characteristics of the aircraft and information about the combat operations in which they were used are given. The book, provided with a large amount of illustrative material, is intended for a wide range of readers.

1. SOVIET AIRCRAFT AND SCIENCE BEFORE AND DURING THE SECOND WORLD WAR

The first research organizations and centers that carried out theoretical and experimental research in various fields of aviation science and technology appeared at the beginning of the 20th century. By the end of the 1920s, the University of Göttingen turned into the Institute of Hydroaerodynamics, which conducted fundamental research in the field of aerodynamics, strength of aircraft structures, gas dynamics of engines, etc. Established in 1912, the German Aviation Research Institute (OU) after two decades has become a major aviation center.

in the USA in 1915. The National Advisory Committee for Aeronautics (MASA-Mapopa! Ayui5ogu Sotkee Gog Aegopashis5) was formed, under whose auspices research centers began to form. In 1958 it was reorganized into the National Aeronautics and Space Administration (MAZA). In England, in 1918, on the basis of the Royal Aviation Plant (Kowa! Apsgai Gasogu), the Royal Aviation Research Institute (Koua! Apsgai Eztga Bisptesh, KAE) was established. At this institute, by the end of the First World War and in the first post-war years, more than 500 aircraft were created. In subsequent years, the institute provided the scientific and technical base for aircraft and aircraft engine building, aviation equipment.

Similar organizations were created in some other European countries: in 1919 in the Netherlands - the National Research Institute for Aviation and Astronautics (Majopa! Gisscheep Kiiteuaag-!abogahyugit), in 1922 in Czechoslovakia - Aviation Research and Testing Institute (Mugkishpu a 4 Kisebpi Gegesku (au), in 1926 in Poland - Institute of Aviation (Gosma noise), etc.

In Russia, the first aerodynamic laboratory appeared at Moscow University in 1902; in 1904, the first specialized Aerodynamic Institute was founded in Kuchin near Moscow; in 1910, an aerodynamic laboratory appeared at the Imperial Technical School (later MVTU). | December 1918, at the initiative of Professor Nikolai Egorovich Zhukovsky, the Central Aerohydrodynamic Institute (TsAGI) was established in Moscow, the main activity of which at that time was the creation of the foundations of aviation scientific and technical disciplines, the development of recommendations in the field of construction of aircraft, aerosta- commodities and airships, as well as the design and construction of the first Soviet aircraft monoplanes of all-metal structures. In 1925 TsAGI put into operation the largest by that time wind tunnel with two closed-type working parts (T-I-T-P), which made it possible to start studying a number of the most important problems of aircraft aerodynamics.

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Created in the late 20s. at TsAGI, the hydraulic laboratory and hydrochannel (1930) provided an experimental base for research in the development of hydroaviation, high-speed ships, and the construction of hydroelectric power stations. In the late 20's - early 30's. the construction of experimental helicopters and gyroplanes was launched.

In July 1929, a resolution “On the state of the defense of the USSR” was issued, which noted: “One of the most important results of the past five years should be recognized as the creation of a red air fleet. Consider that the most important task for the coming years in the construction of red aviation is to bring its quality to the level of advanced bourgeois countries as soon as possible, and by all means should be planted, cultivated and developed by our own, Soviet scientific and design forces, especially in engine building.

In the subsequent period, in the course of the development of domestic aviation and the aviation industry, the network of scientific research

aviation research institutes in the USSR was constantly expanding. In October 1930, the State Research Institute of Civil Aviation (GosNII GA) was established in Moscow, designed to address issues related to the operation of civil aviation. On the basis of departments and laboratories of TsAGI, in 1930 the Central Institute of Aviation Motors (CIAM) was organized, in `1931 - the Hydropower Institute and the Wind Power Institute, in 1932 - the All-Union Institute of Aviation Materials (VIAM). In 1932, the State Institute for the Design of Aircraft Plants (Giproavia) was organized, in 1936 the Central Institute of Labor was transferred to the aviation industry, which later became known as the Research Institute of Aviation Technology and Organization of Production (NIAT). Just before the war, in 1941, the Flight Research Institute (LII) began to function; in August 1941, the Novosibirsk branch of TsAGI was formed (since 1946, SibN IA).

In 1937-1940. in the village of Stakhanovo near Moscow (now the city of Zhukovsky), a new TsAGI experimental base was created, including large wind tunnels (T-101 and T-104), small wind tunnels (T-102 and T-103), a vertical spin wind tunnel T -105, pipes of high speeds and variable density (T-106 and T-15), a complex of installations for researching the strength of aircraft structures (a hall for static testing of aircraft, a hall for dynamic testing of aircraft units, a mechanical laboratory for testing samples of materials and elements structures, etc.).

Despite the measures taken for the speedy development of aviation science, we were significantly behind Germany in terms of the scale of scientific work in this area by the beginning of the war; — with transonic flow velocities and 8 — with supersonic velocities). The largest center was the German Aviation Research Institute (OU). It had departments: aerodynamics, gas dynamics, flight mechanics, aircraft strength, propulsion systems, thermodynamics and working processes in engines, research and testing of materials, instruments and air navigation, fi

physics and electrophysical research, automatic control, aviation medicine and equipment, a high-altitude laboratory for testing aircraft engines and their units under conditions corresponding to altitudes up to 9-10 km, etc. In addition to the above departments, it also included the Institute of Hydroaviation (Hamburg).

The second largest aviation research center named after G. Goering (GEA) was considered. He was engaged in research in the field of aero- and gas dynamics, strength of aircraft structures, kinematics, as well as in the field of aircraft engines and aircraft weapons. Laboratories were located in 60 buildings, scattered for the purpose of camouflage in the area

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terrain with a length of 6.5 km. In total, CEA had 11 high-speed wind tunnels, 28 weapons laboratories, 8 propulsion laboratories, and several auxiliary workshops. The department of strength testing had a number of well-equipped laboratories, which made it possible to carry out static tests of aircraft and individual units at loads up to 60 tf.

The Institute of Fluid Dynamics (AMA) consisted of departments of theoretical aerodynamics, gas dynamics, aircraft aerodynamics, development of wind tunnels, measuring equipment, hydraulic equipment, research into the cooling of aircraft and engine elements, aircraft design and strength, development and research of propellers.

In addition to specialized scientific centers, the largest German aviation firms also had scientific laboratories. For example, the experimental design base and laboratories of the Heinkel company were a whole complex, which included: a design bureau, a design bureau, an experimental bureau, a test flight bureau, an improvement bureau, a production preparation bureau, a laboratory of static and dynamic strength testing, a laboratory for physical testing under conditions of variable temperatures, a laboratory for the study of corrosion and anti-corrosion agents, a laboratory for combustibles and lubricants, a laboratory for testing flight safety equipment, an X-ray laboratory, a flight test station, two wind turbines , Laboratory for Testing Jet Engines. Aircraft factories

THAT

dy firm "Heinkel" had over 150,000 m? production areas, they employed about 27,000 people.

The experimental design base of the Junkers company in Dessau was a large research institute, which included an experimental aircraft building and two engine building plants, a number of research laboratories. This entire complex was located on a territory with a total area of 59 hectares and had a large staff of employees (for example, only 1200 people worked in the design department). The production base of the Junkers company consisted of aircraft, engine and aggregate plants with a total area of about 870,000 m², which employed 112,000 people.

The VMU company had a main design office and a central experimental station at the company's leading aircraft engine plant in Munich, where the high-altitude laboratory for testing jet engines was also located. The second design bureau, located first in Berlin (Spandau), and then in 1944 evacuated to Stassfurt, had a design department, a department for testing engines (including jet engines), a laboratory for testing instruments, pilot production, flight test department. The total number of employees of departments and laboratories was 1700 people. In addition, there was also a design bureau on the basis of the experimental design plant (Unzenburg), located underground in old salt mines. 22,400 people worked at the aircraft-building factories of the company and their branches, the total area of production areas was 96,000 m².

The Focke-Wulf firm had a research department, which included 250 designers and 350 scientists and engineers. Other leading German aviation companies also had their design bureaus and research departments: Messerschmitt at the leading plant in Augsburg, Dornier at the leading plant in Friedrichshafen, Blom and Voss in Hamburg, etc.

Much attention in the Soviet Union was paid to the training of specialists for military and civil aviation. In September 1919, on the initiative of Professor N.E. Zhukovsky, the Moscow Aviation College was established, which a year later was transformed into the Institute of Engineers of the Red Air Force.

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fleet, in 1922 it was reorganized into the Air Force Academy named after Professor N.E. Zhukovsky, from April 1925 - Air Force Academy of the Red Army named after Professor N.E. Zhukovsky (now the Air Force Engineering Academy named after Professor N.E. Zhukovsky). In 1940, the Military Academy for Commanders and Navigators (now the Yu.A. Gagarin Air Force Academy) was formed.

In 1930, on the basis of the aeromechanical faculty of the Moscow Higher Technical School, the Moscow Aviation Institute (MAI) was created, in the same year the Kharkov Aviation Institute (HAI) was founded. In 1932, the Kazan Aviation Institute (KAI) and the Ufa Aviation Institute (UAI) were founded, originally based in Rybinsk, Yaroslavl Region, and in 1941 relocated to Ufa. In 1933, the Airship Building Training Plant was formed, which was later transformed into the Moscow Institute of Engineers of the Civil Air Fleet named after K.E. Tsiolkovsky, and in 1940 the Moscow Aviation Technological Institute (MATI) was established on its basis. In 1941, the Leningrad Institute of Aviation Instrumentation (LIAP) was established, and in 1942, the Kuibyshev Aviation Institute (KuAI).

The first domestic research center for rocket design was the Gas Dynamics Laboratory (GDL), established in 1921 in Moscow specifically for the development of rocket shells using smokeless powder; in 1927, the GDL was transferred to Leningrad. In 1927-1933. here rocket shells of several calibers for various purposes were developed. In 1931, a public organization, the Jet Propulsion Study Group (GIRD), was created under Osoaviakhim, and at the end of 1933, the world's first Jet Research Institute (RNII) was established in Moscow on the basis of the GDL and GIRD. But in this area, too, we lagged significantly behind the Germans, who in the early 30s. a long-range missile program was already in operation. To implement this program, an army test center for liquid rockets was organized at the Kummersdorf artillery range, located a few tens of kilometers from Berlin, in 1932, and in 1935 the Rocket Center in Peenemünde (NUR - Neegev Wegziswap ai Reepetipde), which was operated jointly by the Wehrmacht and the Luftwaffe. Soon, a power plant, a large plant for the production of liquid

oxygen, a rocket assembly plant, a materials research institute, a supersonic wind tunnel, a test airfield, missile launchers, etc. In the future, it was planned to increase the number of technical personnel of the center to 30,000 people, rail and air links to Berlin. The entire territory of the center was divided into two zones: the western one, in which the Luftwaffe conducted their research, and the eastern one, which was the area of responsibility of the Wehrmacht.

20s in the Soviet Union became a period of formation and strengthening of the main teams of aviation designers. Thus, for example, the development and construction of aircraft at TsAGI was initially carried out by the AGOS department (Aviation, Hydroaviation, Experimental Construction) under the leadership of Andrey Nikolaevich Tupolev. At that time with A.N. Tupolev worked A.A. Arkhangelsky, A.N. Putilov, V.M. Petlyakov, P.O. Sukhoi, V.M. Myasishev, V.N. Belyaev, who in the 30s. they themselves led the design teams.

The team of the Land Aircraft Building Department (OSS), which had been working at the Mo 25 plant since 1927, was headed by Nikolai Nikolaevich Polikarpov, with whom V.V. Nikitin, I.V. Venevidov, S.A. Kocherigin; Samsonov, V.B. Shavrov, N.G. Mikhelson and others. In the design bureau of the Frenchman P.E. Richard, invited to the Soviet Union to build naval aircraft, worked. I.V. Ostoslavsky, N.I. Kamov, M.I. Gurevich, S.P. Korolev, G.M. Mozharovsky I.V. Chetverikov, N.K. Skrzhinsky, G.M. Beriev,

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V.B. Shavrov and others. I.G. Neman, A.Ya. Shcherbakov, D.L. Tomashevich and others.

At the beginning of 1933, the Central Design Bureau for Experimental Aircraft Construction of Light Aircraft and Military Series was separated from the TsAGI Experimental Construction Sector (TsAGI SOS), headed by Sergei Vladimirovich Ilyushin. In 1934, Aleksandr Sergeevich Yakovlev received a production base, and a department of light aircraft was formed in the GUAP under his own leadership. In 1936, the design department and the experimental design plant (ZOK) were separated from TsAGI into an independent organization headed by A.N. Tupolev.

By the end of the 20s. The Soviet aviation industry gradually switched to the production of aircraft of domestic design. Significant successes were achieved in the early 1930s, when advanced aircraft for their time appeared: fighters, long-range bombers, high-altitude aircraft, airborne equipment, etc. In 1929-1933. The Soviet aviation industry produced 7,230 aircraft, including 636 fighters and 551 bombers. By the beginning of 1935, there were 28 large aircraft and engine building plants operating in the Soviet Union, among them new plants in Gorky, Voronezh, Irkutsk, Novosibirsk, Komsomolsk-on-Amur, Kazan, Arsenievsk (Primorsky Territory), Perm, Smolensk, Saratov, Dolgoprudny and Khimki, Moscow region. New design bureaus were organized at serial factories.

However, the main brake on the development of our aircraft industry at that time was the low quality of aircraft engines. In 1935, in order to speed up the way out of this situation, a number of licensed engines were purchased from abroad for their production at newly built aircraft engine-building plants. In Rybinsk, at plant No. 26, where Vladimir Yakovlevich Klimov was the chief designer, production of domestic analogues M-100, M-100A, and then new engines M-103, M-104 was organized on the basis of the French Hispano Suiza engine. , M-105. In Perm, at plant No. 19, under the leadership of the chief designer Arkady Dmitrievich Shvetsov, an analogue of the M-25 was produced on the basis of the American Wright engine, and later the M-62, M-63, M-82 were produced. In Zaporizhia, at plant No. 29, under the leadership of the chief designer Arkady Sergeevich` Nazarov, the production of the French Gnome-Ron engine under the designation M-85 was launched, and then the production of new engines M-86, M-87, M-88A, M-88. In Moscow, at plant No. 24, under the leadership of chief designer Alexander Aleksandrovich Mikulin, the M-34 (AM-ZAR, AM-34RN, AM-34FRN), AM-35, AM-35A engines were produced.

Nevertheless, the measures taken could not radically resolve the issue of serial production of powerful and reliable power plants. Most of our aircraft designers developed new aircraft for engines that were either under development or in experimental phase.

production, and in the best case, these were experimental series engines, but not yet brought to the required level of reliability.

Aviation machine-gun and cannon armament was developed under the supervision of Mikhail Evgenyevich Berezin (UB machine gun and gun B), Alexander Aleksandrovich Volkov and Sergei Aleksandrovich Yartsev (VYa gun), Vasily Alekseevich Degtyarev (DA machine gun), Alexander Vasilyevich Nadashkevich and Fedor Vasilievich Tokarev (PV-1 machine gun), Boris Gavrilovich Shpitalny (ShKAS machine gun and ShVAK gun), Alexander Emmanuilovich Nudelman and Alexander Stepanovich Suranov (NS-37 and NS-45 guns).

By the mid 30s. our aviation technology occupied a worthy place in the world in terms of its level. For that time, the I-15 and I-16 fighters, SBi DB-3 bombers, R-10 reconnaissance aircraft, training UT-2, etc. were advanced for that time. Soviet aviation set a number of records in

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carrying capacity and range of flights. I-15 and 15bis fighters successfully operated at the beginning of the Spanish Civil War against Heinkel He 51 and Fiat S.E.32 fighters, Junkers Ji 52 and Savoy Marchetti S.M. .81. However, by the end of the Spanish war, the lag in speed and armament of our fighters from the newly appeared German BE 109 fighter became clear, and the TB-3 and R-5 aircraft had already ceased to meet the requirements of the time, the war with Finland confirmed this .

In the context of growing international tension, the most urgent measures were needed to overcome this lag. By decision of the government, measures were taken to accelerate the development of new aviation equipment, especially fighters, and new design bureaus were organized from young specialists. In 1940, 30,000 highly skilled workers from other industries were transferred to the aviation industry, and 4,000 engineers and technicians were sent from educational institutions. As a result of these measures taken in the Soviet aviation industry, there were qualitative changes in the aerodynamics of aircraft, technology, the production of engines and aircraft equipment, on the eve of the war, Soviet aviation was re-equipped with aircraft of a new type: MiG-3, Yak-1, LaGG-3, IL-2, Pe-2, Yer-2, TB-7 (Pe-8), Ar-2, BB-1 (Su-2) and BB-22 (Yak-2/Yak-4).

However, in quantitative terms, the new type of aircraft accounted for less than 5% of the existing fleet of machines, in addition, not all of them met the requirements of the time. So, for example, the short-range bomber BB-1 (Su-2), which was put into service in June 1940, was taken out of production in April 1942, the total number of vehicles produced was 877 copies. The short-range bomber BB-22 (Yak-2/Yak-4) was taken out of production as early as April 1941, and the total number of vehicles produced was about 200. General. The number of Ar-2 dive bombers built was 71, and the number of TB-7 (Pe-8) heavy bombers was 93. By the beginning of the war, the combat units had only 407 MiG-3 fighters, 142 Yak-1 fighters, 29 LaGG-3 fighters, 128 Pe-2 dive bombers, etc. d.

Thus, the main part of the aircraft fleet of the Red Army Air Force by the beginning of the war consisted of the following types of aircraft: 3552 I-16 fighters, 2898 I-153, 748 I-15, 362 attack aircraft (I-15bis, I-153, Di -6), 4,607 SB medium bombers, 1,622 DB-3 and DB-ZF long-range bombers and 516 TB-3 vehicles, 560 reconnaissance aircraft (R-5, R-10, R-2), etc. e. Although the types of aircraft produced were improved and modernized during the production process, on the whole they corresponded to the level of requirements of the mid-30s, that is, when the SB, DB-3, I-15 and I- 16. By the beginning of the war, there were 9260 combat aircraft on the western border of the USSR.

On June 22, 1941, German troops invaded the territory of the USSR as part of Operation Barbarossa; the Luftwaffe involved 2,796 combat aircraft of four air fleets in this operation (Si both 1, Guy otse 2, Guy otse 4, Ishÿ-Noye 5), which included: Messerschmitt BE 109 and BE 110 fighters, Heinkel He 111, Dornier Rho 17 and Junkers ÿi 86 bombers, Junkers ÿi 87 dive bombers, Henschel attack aircraft H$ 123, reconnaissance aircraft Dornier Oo 17, Heinkel He 45, Heinkel He 46 and Henschel H $ 126, transport aircraft Junkers J and 52, etc.

Together with the Luftwaffe, the aviation of Germany's satellite countries - Italy, Hungary, Romania, Slovakia, Finland and Croatia - fought on the Soviet-German front. So, for example, in
part of the Italian Expeditionary Aviation

corps (Amtalope Sogro de Zref: Lope PaPapo) were Macchi fighters M.S.200 and M.S.202, bombers "Savo a Marchetti" 53. M.81 and "Caproni" Sa.311.

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The aviation of the Hungarian ZespePep Kogrv corps had Hungarian-made aircraft - MM-21 light bombers and Geuesche communication aircraft, German-made aircraft - BE 109 fighters, J and 86K bombers, reconnaissance aircraft He 46, Em 58, Ag 96, Ne 170, Rm 189, Po 215 and Not ITIR, Italian-made aircraft - Fiat fighters S.K.30, S.K.32, S.K.42 and Regiana Ke.2000, bombers " Caproni" Sa.13565 and Sa.310, transport aircraft "Caproni" Sa.101 and "Savoy-Marchetti" 5.M.75.

Romanian aviation units fought as part of the TU Air Corps (GU.EPeregKogrv) of the 4th Luftwaffe Air Fleet. These units were armed with aircraft of their own production - light bombers | AK-39, TAK-80 fighters, L5-79V and JKS-79V bombers (licensed versions of the Italian 5.M.79), German-built aircraft - BE fighters 109 and He 1128 attack aircraft, H$ 129B attack aircraft, Ag 196A reconnaissance aircraft, He 111 bombers, French-built aircraft - Potez 63 light bombers and M.V. 210, Polish-made aircraft - P?I fighters. R-11 and RI. R-24 and RP bombers. P-37, English-made aircraft - Hurricane fighters and Blenheim MK medium bombers.

The Slovak army corps included: Czechoslovak-made aircraft - Avia B-534 fighters and reconnaissance aircraft. "Letov" 53-328, as well as BE 109 fighters and reconnaissance Ru 189 German-made.

Finnish aviation operated together with the 5th Luftwaffe air fleet. At that time, it was armed with aircraft of its own production - Kotka light bombers, Myrski fighters, Puri, Tuiski, Viima and Saasky liaison aircraft, French Codron fighter aircraft. » CE-714 and Moran-Saulnier M.5.406, German BE 109 fighter aircraft, Oo 17 bombers and Ro 22 anti-submarine aircraft, US-made Nau/K 75A and B-239 fighters, Italian Fiat C fighters .50, EoKKeg O-XXI fighters and Fokker S.Kh. Dutch production, English aircraft

production - fighters Vidog, Nigpsape and Slayiaogog, Guzapdeg attack aircraft and ÿÿepÿeÿt bombers, light bombers "Aero" A-32 of Czechoslovak production, etc.

The Croatian Air Force Legion (Kroayspe Gl\aE-Hepieriop), which was part of the 4th Air Fleet, had two fighter squadrons with German BE 109 fighters and one bomber squadron with Oo 17.

Thus, just a few weeks after the start of the war, the Soviet-German front line stretched for almost 4.5 thousand kilometers from the Barents Sea in the north to the Black Sea in the south. The Soviet pilots had to repel the attack in the most difficult conditions, using mainly outdated I-16 and I-153 fighters. As for the new fighters, during the first year of the war, the losses on them turned out to be only slightly less than on the old types.

Despite the huge losses in aviation equipment at the first stage of the war (by the beginning of October 1941, the losses of the Soviet Air Force amounted to more than 5 thousand aircraft), the Soviet aircraft industry, under difficult conditions, managed to evacuate almost 85% of its factories to the east of the country in the first half of 1942. to reach the pre-war level of production, and by the middle of 1943 to surpass the aircraft industry of Germany and its satellites in the production of combat aircraft. The quantitative and qualitative growth of the produced Soviet aircraft became one of the reasons for our pilots to gain air supremacy by the end of the war, which was necessary to defeat the enemy. The advantage of Soviet aviation grew with each subsequent month of the war. By the time the Red Army launched its final offensive against Berlin, its Air Force had at least 7,500 fighters, many of which were as good as the best German models. For the period fron

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Between 1941 and May 9, 1945, the Luftwaffe lost about 60,000 combat aircraft on the Soviet-German front, which accounted for 78% of German aviation losses during the entire Second World War.

2. NORMAL PLANTS

In the 30s. the designations of Soviet military aircraft corresponded to their use - I (fighters), BB (short-range bombers), BSh (armored attack aircraft), PB (dive bombers), DB (long-range bombers), SB (medium bombers), R (scouts) etc. e. From December 9, 1940, combat aircraft of a new type began to be assigned new names according to the initial letters of the names of the chief designers: BSh-2 - Il-2, I-301 - LaGG-1, I-200 - MiG-1, I -26 - Yak-1, PB-100 - Pe-2, BB-1 - Su-2, BB-22 - Yak-2 / Yak-4, etc. d.

Ar-2 |

From the beginning of the 30s. In world aviation, a new tactic appeared that increased the accuracy of bombing attacks, dive bombing. For the first time, this tactic was used by the US Navy pilots on the carrier-based biplane E3S in 1929, then the Germans began to master it on the H$ 123A dive bombers of the Henschel company. In December 1936, the German command sent five H$ 123A dive bombers to the Condor Legion in Spain, where they were first tested in combat conditions. The Spanish Falangists, satisfied with the results of the combat use of aircraft, requested additional deliveries of H$ 123A. In the summer of 1938, the Falangists formed a "Group of 24", which included 16 H123A aircraft. In 1937, the Junkers company began mass production of more powerful dive bombers ÿ and 87 SÿÿkKa. By the middle of 1939, the monthly production of aircraft ÿi 87 in Germany

was 60 vehicles, by the beginning of the war, nine groups of dive bombers included 336 machines ÿi 87ÿ-1.

The first Soviet dive bomber was the SB-RK (a modification of the SB high-speed bomber), which, in comparison with the SB (ANT-40), had aerodynamic brake-grids under the wing, the shape of the engine nacelles was improved, and the dimensions of the vertical and horizontal tail were reduced. . |

In December 1940, the SB-RK received the designation Ar-2 after A.A. Arkhangelsky, since A.N. Tupolev was in prison at that time. Alexander Alexandrovich Arkhangelsky, while working at A.N. Tupolev, participated in the design of all aircraft of the ANT brand, then became the lead designer of the first Soviet front-line bomber SB (ANT-40), in 1936 he headed the design bureau responsible for the serial construction of SB bombers, and then Ar-2.

Initially, it was supposed to build 200 Ar-2 aircraft in 1941, however, the Pe-2 dive bomber went into series, the official state tests of which took place in January-February 1941. Therefore, the number of Ar-2 aircraft built was limited to 71 machines, which were used from the very first days of the beginning of the Great Patriotic War in parts of the Air Force and naval aviation.

Characteristics of the Ar-2: crew - 3 people, power plant - 2 x M-105R with a capacity of 1100 hp each. s., wingspan - 18.5 m and its area - 48.7 m ”, aircraft length - 12.5 m, empty weight - 4430 kg, take-off weight - 6650 kg, maximum speed - 480 km / h, range - 1500 km, practical ceiling - 10,100 m, armament - 4 ShKAS machine guns of 7.62 mm caliber and 1500 kg of bombs.

BB-22 (Yak-2/Yak-4)

A prototype of the S-22 high-speed reconnaissance aircraft with a spaced tail, which first took to the air on February 22, 1939, was developed under the leadership of A.S. Yakov - left,

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who since 1935 worked as the chief designer of the Design Bureau, and in 1940-1946. At the same time, he was Deputy People's Commissar for the aviation industry. Already in the process of testing, the S-22 aircraft was converted into a light bomber, strengthening the defensive armament, increasing the reserves fuel and

equipped with an internal bomb bay. The modified vehicle received a new designation BB-22 (short-range bomber).

Serial production of the BB-22 was launched in December 1939, the first machine took off on December 31, in February 1940 the machine was tested with a ski chassis. In addition to the bombing version, other variants were also developed - the R-12 photo reconnaissance aircraft and the I-29 long-range escort fighter (BB-22IS).

BB-22, equipped with two M-103 engines with a power of 960 hp each. with., developed a maximum speed of 530 km / h, had a flight range of 800 km and a practical ceiling of 8800 m. In 1940, the aircraft was renamed the Yak-2. During the production process, further improvements were made to the design of the Yak-2: the layout of the crew cabin was improved, armor protection was strengthened, more powerful M-105 engines were installed, and external bomb holders were installed.

The new modification received the designation Yak-4, the production of machines of this modification began in the fall of 1940. In February 1941, the aircraft was adopted by the Soviet Air Force, but it was not particularly successful in operation, so it was discontinued in April of the same year. In total, about 200 vehicles of both variants were produced, most of them were lost in combat until the end of 1941, while the surviving vehicles were used until 1945.

Characteristics of the BB-22 (Yak-4): crew - 2 people, power plant - 2 x M-105 with a capacity of 1100 hp each. s., wingspan - 14.0 m, its area is 29.4 m?, aircraft length - 10.18 m, empty weight - 4000 kg, take-off weight - 5845 kg, maximum speed - 574 km / h, range - 1200 km, rate of climb - 920 m / min, practical ceiling - 10,000 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 800 kg of bombs.

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BOK-11

In the summer of 1930, by order of the Revolutionary Military Council at TsAGI, the Bureau of Special Designs (BOC) was organized to study devices of new and unusual designs. The topics of the BOC included high-altitude aircraft, stratospheric balloons, tailless aircraft, rocket-engine aircraft, gyroplanes, etc., the bureau also dealt with flight safety issues. Head

Vladimir Antonovich Chizhevsky was appointed as BOK's nickname.

In 1935, BOK began a series of works on the creation of high-altitude (stratospheric, in the terminology of that time) aircraft. In the fall of the following year, the BOK-I (SS) stratospheric aircraft with a pressurized cabin for a crew of two was built and tested. In fact, BOK-1 was a RD (ANT-25) with a slightly reduced wingspan, a fixed landing gear with fairings on wheels and an M-34RN engine. The pressurized cabin was made in the form of a capsule and inserted into the fuselage. The aircraft was tested in the autumn of 1936, during the tests the ceiling of 10,700 m was reached. After that, the aircraft was made as light as possible, which made it possible to reach a ceiling of 14,100 m in further tests. when flying at altitudes above 8000 m. As a disadvantage, a very limited view from the pressurized cabin was noted.

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In 1938, a variant of the aircraft was tested under the designation BOK -7. BOK-7 structurally repeated BOK-1, but it had a modified pressurized cabin (its walls were the walls of the fuselage) and a new life support system was installed. To improve the visibility for the crew, the pressurized cabin received two convex domes over the seats of the pilot and pilot-observer with several windows each. An M-34FRN with two turbochargers was used as the engine. The aircraft was later used to train crews preparing for long-distance high-altitude flights. During training, the crews lived for several days in the airtight cockpit of the aircraft, which was on the ground.

The following year, a project was developed for the further development of the aircraft under the designation BOK-8, for which a remote control system for rifle installations was developed.

The last modification of the aircraft had the designation BOK-11, structurally it was similar to the previous machines, but it was equipped with a diesel aircraft engine ACH-40 A.D. Charomsky to increase the flight range. The pressurized cabin was made for three people. In 1940, two BOK-11 machines were built, which successfully passed flight tests. According to the test results, it was supposed to prepare one of the machines for a long distance

him a high-altitude flight. However, all further work on BOK-11 was canceled, since V.A. Chizhevsky was repressed, and from 1939 to 1941 he was imprisoned, working in TsKB-29 of the NKVD. The Bureau of Special Designs was disbanded in 1941, and its employees were transferred to the OKB P.O. Sukhoi. |

Characteristics of BOK-11: crew - 2 people, power plant - | x ACh-40 with a capacity of 1500 liters. s., wingspan - 34.0 m, its area is 87.0 mg, aircraft length - 12.9 m.

VI-100

In 1938, the development of the VI-100 high-altitude fighter began, which, in accordance with the terms of reference, was to be equipped with powerful offensive weapons, fly at an altitude of 10,000 m at a speed of 630 km / h and have a practical ceiling of 12,500 m. The work was carried out under the leadership of Vladimir - Ra Mikhailovich Petlyakov, from 1921 to 1936, who worked in A.N. Tupolev at TsAGI, and since 1936 he headed his own Design Bureau. In 1937 V.M. Petlyakov was repressed and was imprisoned until 1940, working in the TsKB-29 NKVD.

The prototype fighter made its first flight on December 22, 1939. The machine, which had a spaced tail, was equipped with two M-105 engines, the pilot was located in the front pressurized cabin, and the navigator-bombardier and gunner-radio operator were in the rear pressurized cabin. Two ShVAK cannons and two ShKAS machine guns were installed in the forward part of the fuselage, and a ShKAS machine gun remotely controlled by a gunner-radio operator was located in the tail part. |

When using the aircraft as a fighter-bomber, it was possible to install external holders for two bombs weighing 250 kg or 500 kg each. In another version of armament, the aircraft could carry two K-76 cassettes in the internal compartment, each of which had 24 artillery (non-feathered) shells of 76.2 mm caliber or two K-100 cassettes with 96 bombs weighing 2.5 kg each. each. The cassettes were supposed to be used against a dense formation of enemy bombers, attacking the formation from above.

After the completion of factory tests on April 10, 1940, two cars were transferred for state testing at the Air Force Research Institute. During the tests, the second car got into an emergency situation and was badly damaged. According to the result

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During the tests of the first machine, a conclusion was made on the aircraft's compliance with the requirements of the technical specifications and recommendations were issued for refinement (increase the area of the keels, change the angle of the stabilizer, etc.) before the construction of an experimental batch of VI-100 aircraft, as well as the creation based on the VI-100 dive bomber.

Taking into account the need for a quick replacement of the main SB front-line bomber, the command of the Red Army Air Force decided to start mass production in June 1940 of the dive bomber PB based on the VI-100, which later received the designation Pe-2.

Characteristics of the VI-100: crew - 3 people, power plant - 2 x M-105 with a capacity of 1100 liters. s., wingspan - 17.15 m and its area 40.5 m?, aircraft length - 12.69 m, height - 3.95 m, empty weight - 5172 kg, takeoff weight - 7260 kg , maximum speed - 535 km/h, range - 1400 km, rate of climb - 588 m/min, service ceiling - 12,200 m, armament - 2 ShVAK guns of 20 mm caliber, 3 ShKAS machine guns of 7.62 mm caliber and up to 1000 kg of bombs. |

VIT/SPB

The air tank destroyer was developed under the leadership of N.N. Polikarpov, who, like many Soviet aircraft designers, did not escape repression. He was imprisoned from 1929 to 1931, working in the TsKB-39 OGPU, where, together with D.P. Grigorovich developed the I-5 fighter. Under the leadership of N.N. Polikarpov worked A.I. Mikoyan, D.L. Tomashevich, M.K. Yangel, A.V. Potopalov, V.K. Tairov and other specialists who later became prominent designers of aviation and rocket-space technology.

The project of the aircraft in two versions, an air tank destroyer (VIT-1) and a multi-seat cannon fighter (MPI-1), was developed by the beginning of 1937. At the end of October 1937, flight tests of a prototype VIT-1 equipped with two M-103 engines with a capacity of 960 hp each. With. The vehicle had enhanced armament: two wing-mounted 37 mm cannons, one 20 mm cannon in the forward fuselage, one machine gun to protect the rear hemisphere, two 500 kg bombs on the external sling and 600 kg bombs in the fuselage bomb bay

ke. During the tests, the aircraft could not reach a speed of 500 km/h, in addition, there were some problems with the stability of the aircraft in flight.

In parallel with the work on HIT-I, N.N. Polikarpov developed the VIT-2 aircraft with M-103 engines and spaced tail unit. By mid-October 1937, the VIT-2 project was presented in three variants: a short-range high-speed bomber (SBL), an air tank destroyer (VIT) and a multi-seat cannon fighter (MPI). The construction of the prototype VIT-2 was completed by May 10, 1938, and the machine took to the air for the first time on May 11. After the completion of factory tests, the M-103 engines were replaced by M-105 engines. In the period from August to September, flight tests of the machine with M-105 engines were carried out, and from September 13 to October 4, 1938, VIT-2 passed state tests. Some shortcomings were identified, as a result of which the car was sent for revision. Testing and refinement of the machine continued until February 1939, and most of the time was spent on fine-tuning the engines. From February 9 to February 26, 1939, repeated state tests of the aircraft were carried out. The test results were positive, and the aircraft was recommended for serial production under the designation VIT-2s (serial) after some changes were made to it.

However, at that time, the Air Force command was more concerned about the creation of a high-speed bomber. Therefore, in July 1939, a decision was made to start serial production of a variant called SPB (high-speed dive bomber). The first flight of the experimental machine took place on February 18, 1940, and soon a small batch of five aircraft was built and tested. During one of the flights on April 26, 1940, the second production aircraft crashed, killing the crew of three people. On June 2, 1940, the third production aircraft crashed while making an emergency landing, caused by a breakdown of the left engine.

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Despite these failures, it was planned in 1940 to produce 15 aircraft of the SPB military series. But after the catastrophe that happened to the first production aircraft on July 20, 1940, all work on the SPB was stopped.

Characteristics of VIT-2: crew - 3 people, power plant - 2 x M-105 with a capacity of 1050 liters. s., wingspan - 16.5 m, its area - 40.76 mg, aircraft length - 12.25 m,

height - 3.4 m, empty weight - 4032 kg, take-off weight - 6302 kg, maximum speed - 513 km/h, range - 800 km, rate of climb - 735 m/min, service ceiling - 8200 m, armament - 2 ShFK-37 37 mm cannons, 4 ShVAK 20 mm cannons, 2 ShKAS 7.62 mm machine guns and up to 1600 kg of bombs. |

Characteristics of the SPB: crew - 3 people, power plant - 2 x M-105 with a capacity of 1050 hp each. s., wingspan - 17.0 mi, its area is 42.93 m2, aircraft length - 11.18 m, empty weight - 4480 kg, take-off weight - 6850 kg, maximum speed - 520 km / h, range - 2200 km;

G-26

At the insistence of the Deputy People's Commissar for Military and Naval Affairs and the Chief of Armaments of the Red Army, Marshal M.N. Tukhachevsky, on the basis of Oskonbyuro (Special Design Bureau), which was engaged in the development of parachute and airborne equipment, a special research institute was organized on issues of airborne landing of troops (Experimental Institute of NKTI).

This institute, headed by Pavel Ignatievich Grokhovsky, was instructed in the summer of 1934 to create a combat aircraft capable of reaching speeds of over 400 km/h. The development of the fighter-interceptor project began under the leadership of the lead designer Boris Dmitrievich Urlapov. The aircraft was given the designation G-26, which originally belonged to the project of a flying car based on a 1934 Ford car. A wing with two M-11 engines and a fuel tank was attached to the roof of the car. The aircraft-car was designed according to the “tailless” scheme, it was controlled using the steering wheel from the second seat of the car. Since the aircraft-car project was not implemented, the designation G-26 was transferred to the fighter project.

The G-26 aircraft was equipped with one Hispano-Suiza 12YYgz engine and a bicycle landing gear retractable in flight. In ka

G-26

As armament, it was supposed to install two ShKAS machine guns in the wing. Work on the construction of an experimental machine was nearing completion, but in 1937 Marshal M.N. was arrested and shot. Tukhachevsky, who always supported P.I. Grokhovsky and his bold ideas. The experimental institute was closed, all work on the G-26 was stopped, the almost completed experimental machine was destroyed, and P.I. Grokhovsky was transferred to an economic position in the Central Council of Osoaviakhim. At the end of 1942, he was arrested on false charges and, according to the official version, died in prison in 1946. However, not so long ago, information appeared that he was shot on May 29, 1943. P.I. Grokhovsky received a certificate from the tribunal of the Moscow Military District stating that the “Grokhovsky case” had been reviewed and terminated “due to the lack of corpus delicti.” Characteristics of the G-26: crew - 1 person, power plant - | x "Hispano-Suiza" 12YRVge with a capacity of 860 liters. s., wing span - 7.0 m and its area 8.96 m?, aircraft length - 6.33 m, empty weight - 1292 kg,

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takeoff weight - 1640 kg, maximum speed - 565 km/h, range - 750 km, service ceiling - 8000 m, armament - 2 ShKAS machine guns of 7.62 mm caliber.

Gr-1

In the summer of 1940, under the leadership of Pyotr Dmitrievich Grushin, who worked in 1934-1940. chief designer of KB MAI and 1940-1941. Chief Designer of the Design Bureau of the Kharkov Aviation Plant, the development of a project for long-range

it was an escort fighter with spaced vertical tail and two AM-37 engines. The aircraft had a powerful armament of two cannons, four machine guns, rockets and 500 kg of bombs, the pilot's cabin was armored.

In the spring of 1941, a prototype Gr-| started flight tests, however, due to the outbreak of war, the aircraft was evacuated, but on the way to the echelon, the aircraft was destroyed during the bombing by German aviation. Further work on Gr-1 was not carried out.

Characteristics Gr-ÿ: crew - | man, power plant - 2 x AM-37 with a capacity of 1400 liters. s., wing span - 15.8 m and its area - 42.0 m?, take-off weight - 7650 kg, armament - 2 ShVAK guns of 20 mm caliber, 4 ShKAS machine guns of 7.62 mm caliber, 8 RS-82 or RS-132 and 500.kg bombs.

Gu-1

In 1940, under the leadership of Mikhail Ivanovich Gudkov, one of the authors of the LaGG-3 aircraft, the development of a single-seat Gu-1 fighter began, which was structurally similar to the R-39 ApasoBga fighter of the American company Vey. A feature of this machine was the location of the engine behind the cockpit, which freed up space for installing a 37-mm cannon in the nose of the aircraft. The propeller was driven by the engine with the help of a long shaft that passed under the pilot's seat.

However, in the conditions of the outbreak of war, work on the Gu-1 was interrupted, and the Gudkov Design Bureau was evacuated to Novosibirsk. At the end of October, by a decision of the Defense Committee, work on the fighter was resumed.

By the spring of 1943, the prototype Gu-1 was prepared for testing, from March to May, in the process of taxiing and approaching, the machine was being finalized. On June 12, 1943, the machine made its first flight, but it ended in a disaster. After that, all work on Gu-1 was stopped.

M.I. Gudkov developed the design of the Gu-2 aircraft, which differed from the Gu-1 in even more powerful armament, including a 45 mm Spital caliber cannon firing through a hollow propeller shaft, two ShVAK cannons, two BS machine guns and two ShKAS machine guns. The maximum flight speed was

be 700 km / h, and the flight range is 1000 km. The project did not materialize.

Characteristics of Gu-1: crew -- | man, power plant - 1 x AM-37 with a capacity of 1400 liters. s., wing span - 10.0 m and its area 20.0 m?, aircraft length - 10.68 m, height - 4.6 m, empty weight - 3742 kg, takeoff weight - 4620 kg, maximum speed - 674 km / h, armament - 1 Sh-37 gun of 37 mm caliber, 6 ShKAS machine guns of 7.62 mm caliber.

Gu-82

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Fighter Gu-82 M.I. Gudkov was a modification of the serial LaGG-3 fighter for a more powerful M-82 engine. The first prototype took off for the first time on September 11, 1941, surpassing the LaGG-3 in further tests in terms of speed, rate of climb and flight range. However, the Gu-82 did not go into production for the reason that its flight characteristics turned out to be lower than that of the La-5.

Characteristics of the Gu-82: crew - 1 person, power plant - 1 x M-82 with a capacity of 1450 liters. s., wing span - 9.8 mi, its area is 17.5 mg, aircraft length - 8.71 m, height - 4.4 m, empty weight - 2700 kg, takeoff weight - 3000 kg, maximum speed - 580 km/h, range - 680 km, rate of climb - 878 m/min, service ceiling - 9600 m, armament - 2 ShVAK guns of 20 mm caliber, 2 BS machine guns of 12.7 mm caliber.

DB-1 (ANT-36)

The record-breaking flights of the RD (ANT-25) aircraft became the basis for the decision to convert the ANT-25 into a long-range bomber, so in 1934 A.N. Tupolev began to develop its new modification. Externally, the aircraft, which received the designation DB-1 (ANT-36), almost did not differ from its predecessor: a new cowl was installed on the engine, a cutout was made in the fuselage for the bomb bay, a gunner's station was equipped, and the equipment necessary for the bomber was installed. Simultaneously with the design, the serial production of ANT-36 was organized. It was planned to build 24 DB-1 bombers, 20 of them by May 1936.

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In the autumn of 1935, the first serial DB-I was flown, but the military commission refused to accept it as clearly unsuitable for use in the Air Force. The same fate awaited the next seven aircraft, which required, at best, long-term refinement. Of the 18 built aircraft, only 10 aircraft were transferred to the combat unit stationed near Voronezh. In the period from 1936 to 1937, the average annual flight time of aircraft was only 25-30 hours, although some of them flew up to 60 hours. Trial operation of the DB-1 showed that the ANT-36 did not have the necessary bomb load and flight speed for aircraft of this class, it was actually defenseless against modern fighters, but it had a very long range.

In these circumstances, the NKAP decided not to spend energy and resources on the further development of the ANT-25 scheme, but to concentrate all efforts on the development of new aircraft ANT-37 (DB-2) and TsKB-30 (DB-3).

Characteristics of DB-I: crew - 3 people, power plant - | x M-34R with a capacity of 900 liters. s., wing span - 34.0 m and its area 87.1 m?, aircraft length - 13.0 m, empty weight - 3784 kg, takeoff weight - 10,000 kg, maximum speed - 244 km / h, range - 10,800 km, practical ceiling - 7850 m, armament - ÿ DA machine gun and 400 kg of bombs.

DB-2 (ANT-37)

At the end of 1933, Pavel Osipovich Sukhoi, who worked in A.N. Tupolev at TsAGI, began designing a twin-engine long-range bomber DB-2 (ANT-37), capable of carrying 1,000 kg of bombs at a speed of 350 km/h at a range of 3,500 km. The aircraft was equipped with two M-85 engines with a power of 800 hp each. With. The prototype was equipped with a rotating turret with one machine gun and a second turret with a coaxial machine gun behind the cockpit. The crew consisted of 3 people - a pilot and two gunners.

The car made its first flight on June 15, 1934, during tests it turned out that tail flutter occurs at speeds above 250 km / h. On July 20, test pilot M.M. Gromov managed to land the plane, whose tail fuselage began to collapse in flight at a speed of about 340 km/h.

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The second experimental aircraft DB-2bis took off for the first time on February 25, 1936. Tests showed that its speed was below the requirements of the technical specifications, but the range significantly exceeded these requirements. In August 1936, the aircraft made a non-stop flight on the route Moscow--Omsk--Moscow, which amounted to 4995 km. Although the Air Force showed no interest in the DB-2 aircraft, it was decided to modify the aircraft to perform record-breaking flights in range. The engines were replaced with more powerful M-86s, new propellers were installed, the capacity of the fuel tanks was increased, and the armament was removed. It was expected that as a result of the improvements, the range of the aircraft, which received the designation “Motherland”, would increase to 7000-8000 km. |

The Rodina aircraft with a female crew on board (commander V. Grizodubova, co-pilot P. Osipenko and navigator M. Raskova) took off on September 24, 1938, from the airfield in Monino and headed for the Far East. The flight lasted 26 hours and 29 minutes, during which time the plane flew a distance of 5908 km and landed in the Khabarovsk Territory near the village of Kerbi near the banks of the Amur River.

Characteristics of DB-2 (ANT-37): crew - 3 people, power plant - 2 x M-85 with a capacity of 780 liters each. s., wing span - 31.0 m and its area - 85.0 m ?, aircraft length - 15.0 m, height - 4.19 m, empty weight - 5800 kg, takeoff weight - 9456 kg, maximum speed - 342 km / h, range - 4995 km, armament - 3 ShKAS machine guns of 7.62 mm caliber and 1000 kg of bombs. E

DB-3 (IL-4) E

In the second half of 1934, in the design bureau of S.V. Ilyushin, who at the same time was the head of the 1st Main Directorate of the People's Commissariat of the Defense Industry, under the leadership of A.A. Senkov developed a bomber project called TsKB-26. In April 1936, the first flight of TsKB-26 took place; in the summer of the same year, test pilot V.K. Kokkinaki set five world records on it and for the first time on an aircraft of this class demonstrated the execution of a dead loop. The aircraft was not serially built. Work on the further development of the hamlet led to the creation of TsKB-30

(DB-3). 31

IL-4

According to the results of flight tests of the first sample, during which several world records of speed, range and carrying capacity were set on it, the construction of the second sample, which received the designation TsKB-30, began. In the spring of 1936, tests of the TsKB-30 aircraft began, and in August of the same year it was put into service and put into production under the designation DB-3. In 1937, the first DB-3 aircraft entered service with long-range bomber units.

In March 1938, the DB-3 was undergoing state tests as an escort aircraft for long-range bombers. This machine had the factory designation TsKB-54 and was equipped with powerful small arms and artillery weapons to repel enemy fighter attacks on the formation of escorted bombers. However, this version of the aircraft was not put into service, so all work on it was stopped. |

For aviation of the Navy, a version of the aircraft was developed under the designation DB-ZT (torpedo bomber). However, the torpedo bomber could also carry bombs and mines, which made it possible to use it as a conventional bomber and minelayer. In addition, when necessary, it was used as a long-range naval reconnaissance. Based on DB-ZT aircraft in the fleet in 1939-1940. units of mine-torpedo aviation were formed, the main purpose of which was to destroy enemy ships, mine enemy fairways and exits from naval bases. Since DB-ZT could only take off from land aero

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dromov, then at the beginning of 1938 a new version of the aircraft appeared under the designation DB-ZTP (float torpedo bomber). The aircraft was mounted on floats, which, if necessary, were quickly replaced by a wheeled landing gear; in addition, it had special equipment to ensure its operation when based at sea (bottom anchor with a bollard, anchor winch, etc.). Flight tests of the DB-ZTP were carried out in the summer of 1938, but it did not go into production, since it was much more difficult to operate than the land version.

In May 1939, flight tests of the next version of the aircraft began under the designation DB-3F, according to the test results, the aircraft was put into service in the fall, and later it received the designation Il-4. During the Great Patriotic War, the IL-4 was continuously improved, being produced in bomber and torpedo bomber versions. IL-4 became the main long-range bomber of the Soviet Air Force.

The DB-3 aircraft took part for the first time in combat operations against Japanese troops in China, where the Soviet Union delivered 24 aircraft in 1939. Then he took part in the Soviet-Finnish war, where his first modifications, having no powerful small arms, suffered heavy losses from the Finnish planes Vgizio! Wipdog, Sioviet Safatog and EokKeg O.XXI.

From the very first days of the Great Patriotic War, DB-3s began to carry out bombing strikes on military-industrial facilities and German airfields. So, for example, on June 25, as a result of a raid by DB-ZF bombers from the 207th long-range bomber regiment
aviation on

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ARCHIVAL MATERIALS 1943

Three-color camouflage scheme for IL-4 aircraft

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one of the airfields near Vilnius was almost completely destroyed by German BE 109 fighters of the second group of the 27th fighter squadron (P/TO 27), as a result of which P/TO 27 was taken to Germany for re-equipment and re-staffing.

In early August 1941, the Soviet command set the task of delivering a bomb attack on Berlin from the Kagul airfield on Saaremaa (Esel Island) in the Baltic Sea. The Luftwaffe command believed that the powerful air defense of Berlin, which included 736 anti-aircraft guns, hundreds of fighters, barrage balloons and 160 searchlights, reliably protected the German capital from air strikes. The British could not overcome the air defense of Berlin, and the United States did not even try to bomb the German capital until January 1943. Therefore, the bombing strike of Soviet aircraft on Berlin, planned for early August 1941, was then of great political importance.

On the basis of the decision of the Stavka, 15 crews from the 1st Mine and Torpedo Regiment of the Baltic Fleet Aviation were trained. On the night of August 4-5, five DB-ZF aircraft carried out a reconnaissance flight to Berlin. It was established that the anti-aircraft defense was located in a ring around the city within a radius of 100 km. At the appointed time, on August 7 at 21:00, a group of 15 DB-3F bombers, led by the regiment commander, Colonel E.N. Preobrazhensky, rose into the air. At about one in the morning, after dropping bombs on Berlin, the planes turned north to the sea. Only then did Berlin's air defense catch on - searchlights turned on, anti-aircraft guns began to work, night fighters with headlights lit up into the air. The arrows of our bombers fought off from all the onboard machine guns, and only over the Baltic did the German fighters fall behind. All our vehicles returned safely to base.

The next day, the German newspapers reported: “British aircraft bombarded Berlin. There are dead and wounded. Six British planes shot down. English newspapers were quick to refute this version: their planes did not appear over Berlin that day. There was no reason not to believe this, so the Germans had to admit that this successful raid was carried out by Soviet aircraft, contrary to the statements of Goebbels propaganda about the "complete destruction

Research Institute of Soviet Aviation. The raids on Berlin turned into a lengthy and complex operation. They ended on September 5, 1941, by which time ten raids (90 sorties) had been made, as a result of which 327 bombs weighing 250 kg each were dropped and 32 fires were registered, our losses amounted to 4 bombers. In these raids, in addition to DB-ZF aircraft, Pe-8 bombers under the command of Hero of the Soviet Union M.V. Vodopyanov. By decrees of the Presidium of the Supreme Soviet of the USSR, ten pilots who participated in raids on Berlin were awarded the title Hero of the Soviet Union, 13 pilots received the Order of Lenin, and 55 were awarded the Orders of the Red Star and the Red Banner of War.

A total of 1,528 DB-3 aircraft and 5,256 DB-3F (IL-4) aircraft in various modifications were built.

Characteristics of TsKB-26: crew - 2 (3) people, power plant - 2 x M-85 with a capacity of 760 hp each. s., wing span - 21.4 m and its area - 65.5 m?, length - 13.7 m, height - 3.8 m, empty weight - 4000 kg, takeoff weight - 6000 kg, maximum speed - 390 km / h, range - 4000 km, rate of climb - 331 m / min, service ceiling - 10,000 m, armament - 1000 kg of bombs.

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Characteristics of DB-3: crew - 3 people, power plant - 2 x M-87A with a capacity of 950 hp each. s., wing span - 21.44 m and its area - 65.5 m ', aircraft length - 14.22 m, height - 4.19 m, empty weight - 5270 kg, takeoff weight - 9500 kg, maximum speed - 439 km / h, range - 3800 km, practical ceiling - 9300 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 2500 kg of bombs.

Characteristics of DB-ZT: crew - 3 people, power plant - 2 x M-85 with a capacity of 780 hp each. s., wing span - 21.44 m and its area - 65.6 mg, aircraft length - 14.22 m, height - 4.19 m, empty weight - 4298 kg, takeoff weight - 6494 kg, maximum speed - 395 km / h, range - 1800 km, practical ceiling - 7800 m, armament - 3 ShKAS machine guns of 7.62 mm caliber, 1000 kg of bombs (min) or 1 torpedo weighing 940 kg.

Characteristics of Il-4T: crew - 4 people, power plant - 2 x M-88B with a capacity of 1100 hp each. s., wing span - 21.44 m and its area - 66.7 mg, aircraft length - 14.76 m, height - 4.19 m, empty weight - 5800 kg, takeoff weight -

11,570 kg, maximum speed - 430 km / h, range - 3800 km, practical ceiling - 9700 m, armament - 1 UBT machine gun of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber and 1 torpedo weighing 940 kg . |

DB-4 (TsKB-56)

In 1939 OKB S.V. Ilyushin began to develop a high-speed long-range bomber DB-4 (TsKB-56). It was assumed that the aircraft would be equipped with two M-120 or AM-36 engines, which were under development at that time. Compared to the DB-3F, the new bomber was larger in size, had a two-fin empennage, and the aircraft crew consisted of 4 people.

By October 1940, a prototype DB-4 was built, which, due to the lack of upgraded M-120 or AM-36 engines, was equipped with AM-37 engines. The first flight of the experimental machine took place on October 15, 1940, during the tests many shortcomings were revealed, which were taken into account and eliminated during the construction of the second experimental machine. However, after several flights during factory tests, it was decided not to present the DB-4 for state tests, but to stop all work on it, since in October 1940 the Yer-2 bomber of the same class was put into production.

Characteristics of DB-4 (TsKB-56): crew - 4 people, power plant - 2 x AM-37 with a capacity of 1030 hp each. s., wing span - 25.0 m and its area - 83.0 m?, aircraft length - 17.85 m, height - 5.1 m, empty weight - 7561 kg, takeoff weight - 13,000 kg, maximum speed - 500 km / h, range - 4000 km, practical ceiling - 10,000 m, armament - 3-4 ShKAS machine guns of 7.62 mm caliber and 3000 kg of bombs.

DB-A

In 1933, a group of teachers and engineers of the Air Force Academy under the leadership of Viktor Fyodorovich Bolkhovitinov, chief designer since 1937, began work on a deep modernization of the TB-3 bomber. The prototype under the designation DB-A (DB-academy) was ready in November 1934; it first took to the air on May 2, 1935, equipped with four M-34RN engines.

Flight tests of the DB-A aircraft showed that it surpasses its predecessor in all respects. Moreover, it set several world records in terms of carrying capacity, and after some refinement, the car, which received the civilian designation H-209, was prepared in August 1937 for a non-stop flight from Moscow over the North Pole

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to America (Fairbanks, Alaska). However, shortly after the aircraft, the crew commander of which was S.A. Levanevsky, they reported on the radio about the flight over the North Pole, the connection with the machine was cut off. The subsequent many months of searching for the aircraft did not lead to anything.

Despite the tragedy that happened to the first experimental aircraft, the second experimental aircraft under the designation DB-2A with more powerful M-34FRN engines was undergoing state tests. According to the test results in 1938, a small series of 16 machines was ordered. Until the end of 1939, 12 aircraft were built, but the following year the remaining 4 aircraft were not built, since the more advanced TB-7 bomber went into production.

Other projects were also developed, in particular, the BDD long-range bomber (a faster modification of the DB-A with four M-34FRN engines) and the heavy cruiser TK-1, equipped with powerful weapons (3 cannons, 5 machine guns and 8 rocket projectiles).

Characteristics of DB-A: crew - 7 people, power plant - 4 x M-34RN with a capacity of 900 hp each. s., wingspan - 39.5 m, its area - 230 m?, aircraft length - 24.4 m, empty weight - 15,400 kg, take-off weight - 21,900 kg, maximum speed - 316 km / h, range - 4500 km, practical ceiling - 7730 m, armament - 1 ShVAK gun of 20 mm caliber, 6 ShKAS machine guns of 7.62 mm caliber and 6500 kg of bombs.

DVB-102 (VM-1) |

In 1939, under the leadership of Vladimir Mikhailovich Myasishchev, who had been working in A.N. Tupolev in TsAGI, who was unreasonably repressed and worked in prison from 1938 to 1940 in the Central Design Bureau-29 of the NKVD, began the development of a long-range high-altitude bomber, the design of which provided for two pressurized cabins for the crew.

Work on the first prototype DVB-102, which began in June 1940, was interrupted in August 1941 due to the evacuation of the design bureau to Omsk.

The first flight of an experimental vehicle equipped with M-120TK engines took place on February 17, 1942. During flight tests, the unreliable M-120TK engines were replaced by M-71 engines. In August 1943, the second experimental aircraft, equipped with new engines, flew from Omsk to Moscow. There, his tests continued until the very end of the war, after which all work on the DVB-102 (VM-1) was stopped.

Characteristics of DVB-102: crew - 4 people, power plant - 2 x M-120TK with a capacity of 1800 hp each. s., wingspan - 25.17 m, aircraft length - 18.9 m, empty weight - 9900 kg, takeoff weight - 16038 kg, maximum speed - 529 km/h, range - 3340 km, practical ceiling - 10,500 m, armament - 1 ShVAK gun of 20 mm caliber, 2 UBK machine guns of 12.7 mm caliber, 1 ShKAS machine gun of 7.62 mm caliber and 3000 kg of bombs.

DB-108

In 1943 V.M. Myasishchev was appointed head of the design bureau instead of V.M. Petlyakov, who died in a plane crash on January 12, 1942. Under the leadership of V.M. Myasishev, on the basis of the two-seat bomber Pe-2I with VK-107A engines, in the summer of 1944, the development of a long-range bomber DB-108 with VK-108 engines began.

Three variants of the machine were developed: a two-seat VM-16 bomber with a maximum speed of 700 km/h, a three-seat dive bomber VM-17 with a maximum speed of 670 km/h, and a four-seat bomber VM-18 with a bomb load of up to 4,000 kg. The first experimental machine was built in the VM-16 variant and was flight tested until the end of the war. The second experimental machine was built in the VM-17 version, but before the end of the war it did not have time to take to the air. With the end of the war, all work on the DB-108 was stopped.

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Characteristics of DB-108 (VM-16): crew - 2 people, power plant - 2 x VK-108 with a capacity of 1800 liters each. s., wing span - 17.8 m and its area - 43.0 m?, aircraft length - 13.47 m, empty weight - 6953 kg, takeoff weight - 9431 kg,

maximum speed - 700 km/h, range - 2,250 km, rate of climb - 1,000 m/min, service ceiling - 11,000 m, armament - 1 ShVAK cannon, 20 mm caliber, 2 UBK machine guns, 12.7 mm caliber, 1 ShKAS machine gun of 7.62 mm caliber and 3000 kg of bombs.

DI-6 |

In 1934, under the leadership of Sergei Aleksandrovich Kocherigin and Vladimir Panfilovich Yatsenko, a project was developed for the two-seat fighter DI-6. The aircraft, which was a biplane with an M-25 engine and retractable landing gear in flight, was built in 1935, passed state tests and was put into mass production. Since 1937, the aircraft was equipped with a more powerful M-25V engine. A total of 200 DI-6 aircraft were built, including ground attack aircraft (DI-6Sh) and training aircraft (DI-bbis and DI-6UT). Aircraft DI-6 took part in the battles with the Japanese in the area of the Khalkhin-Gol river, in the Soviet-Finnish war and in the first months of the Great Patriotic War.

Characteristics of DI-6: crew - 2 people, power plant - I x M-25 with a capacity of 700 liters. s., wingspan - 10.0 m and their area - 25.15 m", aircraft length - 7.0 m, height - 3.2, empty weight - 1360 kg, take-off weight - 1955 kg, maximum speed - 372 km/h, range - 550 km, rate of climb - 500 m/min, practical ceiling - 8000 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 50 kg of bombs. |

DI-3

DI-8 (ANT-46)

Since September 1935, the team of A.A. Arkhangelsky began the development of the long-range fighter DI-8 (ANT-46), intended to escort the formation of bombers. The prototype for the DI-8 fighter was the SB (ANT-40) bomber. Long-range fighters at that time were still called "cruisers", they had to have especially powerful weapons. The cannon armament of the DI-8 consisted of a ShVAK cannon under the fuselage and two APK-4 dynamo-reactive cannons installed in the wing. Machine-gun armament included one ShKAS on the TUR-9 turret, one at the bottom of the shooter and two fixed ShKAS in the center section for firing backwards.

Attempts to install dynamo-reactive cannons (DRP - a recoilless gun in which the recoil when fired is balanced by a jet of powder gases flowing from the breech) were made back in the period of the First World War. At that time Colonel of the Russian army Gelwig proposed to install a three-inch “recoilless gun” on an airplane. In the fall of 1916, a 70-mm DRP designed by M.D. Ryabushinsky. In the 20s. In the Soviet Union, several design teams were already developing guns of this type.

In February 1929, Leonid Vasilievich Kurchevsky, who had been developing the DRP since 1923, managed to convince the leadership of the Artillery Directorate of the Red Army that the DRP of his systems was the most effective. As a result, he received a secret assignment and set about creating recoilless guns for the army, air force, and navy. For the armament of the aircraft, the development of three- and four-inch DRIs was started. The first task was considered to be the single-shot 76.2-mm cannon APK-1, which was supposed to equip the I-Zi I-4 fighters.

The first official demonstration of APK-I took place in April 1930, after which the Air Force, having ordered 20 units of the DRP, decided to test it on reconnaissance aircraft R-I and R-2. Despite the fact that both aircraft were severely damaged after several shots were fired, the results of the first experiments were encouraging.

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With the approval of I.V. Stalin and with the direct support of the chief of armaments of the Red Army M.N. Tukhachevsky and People's Commissar of Heavy Industry G.K. Ordzhonikidze for

expansion of L.V. Kurchevsky, the Directorate of the Commissioner for Special Works under the People's Commissariat for Heavy Industry (abbreviated as USR - Directorate of Special Works) was created. There, for the armament of aircraft, AICs of calibers 37, 65 were designed and built; 76 and 102 mm. Variants of guns were also developed for installation on ships and tanks, as well as recoilless infantry systems.

During the factory tests of the DI-8 aircraft, which began on August 1, 1935, the maximum speed near the ground was 333 km/h, which was practically equal to the speed of the SB bomber with Hispano-Suiza engines — 332 km/h . The plane was not transferred to state tests.

The second prototype DI-8bis (ANT-46bis), which was built in 1936, had a new horizontal tail and a keel with an enlarged rudder; instead of the APK-4 guns, four ShVAK guns were installed in the wing (as an option, the possibility of installing five ShVAK guns on the ventral lowered gun carriage). It was also supposed to install more powerful M-ZARNF engines. However, due to the fact that the preparation of the aircraft for state tests was delayed, the Air Force refused to continue work on the DI-8.

Characteristics of DI-8 (ANT-46bis): crew - 3-4 people, power plant - 2 x M-ZARNF with a capacity of 1200 liters each. s., wing span - 20.3 m and its area - 55.7 m?, aircraft length - 12.24 m, empty weight - 4180 kg, takeoff weight - 5910 kg, maximum speed - 404 km/h, range - 1800 km, practical ceiling - 9000 m, armament - 2 APK-4 dynamo-active cannons or 4 ShVAK cannons of 20 mm caliber, 1 ShVAK machine gun of 12.7 mm caliber, 3 ShKAS machine guns of 7 caliber .62 mm and 250 kg bombs.

DIP (ANT-29)

At the end of July 1931, TsAGI received an assignment to develop a long-range cannon fighter DIP for the 102-mm cannon APK-8 L.V. Kurchevsky. The development of the DIP (ANT-29) began at the beginning of 1933 after receiving from the Air Force updated performance requirements. ANT-29, which was a further development of the MI-3D (ANT-21bis) and I-12 (ANT-21) fighters, was developed under the leadership of A.A. Arkhangelsk.

The aircraft had a smooth skin and retractable landing gear in flight, it was equipped with two Hispano-Suiza 12Ub55 engines, carried in the fuselage one APK-8 102 mm dynamo-reactive cannon, two ShKAS machine guns in the wing root and one ShKAS on the turret at the shooter.

The design feature of the fighter was that the 4 m long cannon passed through the entire fuselage in its lower part, the reloading tray protruded forward, and the diffuser went beyond the tail unit. The crew of two people actually sat astride this cannon. APK-8 ammunition consisted of 16 shells: 6 were in a tubular magazine and 10 in an additional cassette.

The DIP made its first flight on February 14, 1935. During the tests, it turned out that the surfaces of the rudders and ailerons are small to ensure reliable control of the aircraft. Tests also showed that the DIP could reach a speed of 352 km / h at an altitude of 4000 m. The aircraft was returned to the experimental design plant (ZOK) for revision. During the continuation of testing at the end of 1935, there were many different problems, so the state tests scheduled for the first half of 1936 did not pass the aircraft. Soon, work on the DIP was stopped.

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Characteristics of the DIP (ANT-29): crew - 2 people, power plant - 2 x M-100 with a capacity of 750 hp each. s., wing span - 19.19 m and its area - 56.8 m ?, length - 11.1 m, take-off weight - 4960 kg, maximum speed - 352 km / h, armament - 1 cannon APK-8, 3 machine gun ShKAS caliber. 7.62 mm.

Yer-2

The Er-2 bomber was a modification of the high-speed passenger aircraft "Stal-7" by R.L. Bartini (see below). R.L. Bartini, being repressed, from January 1938 did not take part in the construction and testing of his aircraft, which was brought up and tested already without him by a team of designers, which included Vladimir Grigoryevich Ermolaev. The tests of the Stal-7 aircraft were successful, it demonstrated excellent flight qualities, so in January 1939 it was decided to convert it into a bomber. For this purpose, in the Aeroflot system, the organ

the Design Bureau was demoted, headed by V.G. Yermo

laev.

The new Design Bureau set to work energetically and in May 1940 produced a prototype bomber under the designation DB-240. Compared to its predecessor, the DB-240 received a navigator's cockpit in the forward fuselage, a pilot's cockpit shifted to the left side, and two rear gunnery mounts (upper and lower), spaced tail and fuselage bomb bay. In June 1940, a prototype with M-105 engines took off for the first time; it passed flight tests until October of the same year. According to the results of flight tests, the aircraft was launched into a series under the designation Er-2. From the very first days of the outbreak of war, the Yer-2 bombers took part in hostilities; by the autumn of 1941, two aviation regiments equipped with these bombers began to participate in long-range raids on Berlin and Koenigsberg.

At the end of 1941, the design bureau of V.G. Ermolaev was evacuated to Siberia, by the spring of next year it returned to Moscow again, where work continued on the modernization of the Yer-2 aircraft. Er-2/ ACh-Z0B vehicles with ACh-30OB diesel engines and increased flight range went into production; about 300 of them were built by the end of the war.

In 1944 V.G. Ermolaev died of typhus, so the employees of his Design Bureau were transferred to the Design Bureau of P.O. Sukhoi, where the work on Yer-2 continued. A five-seat version of the heavy bomber was developed with a flight range of up to 5,000 km and a bomb load of up to 5,000 kg. At the end of 1944, 3 Yer-2 ON (special purpose) vehicles were built, in which instead of a bomb bay and firing points, a passenger cabin was equipped, designed to carry 9 people. One

of the upgraded Yer-2s at the end of the war, it was used as a carrier aircraft for testing 10X cruise missiles developed by V.N. Chelomeya. A total of 462 Yer-2s were produced before the end of the war.

Characteristics of Yer-2: crew - 4 people, power plant - 2 x M-105 with a capacity of 1100 liters. s., wing span - 23 m and its area - 72.1 m ”, the length of the aircraft. - 16.4 m, empty weight - 6500 kg, take-off weight - 12,570 kg, maximum speed - 437 km/h, range - 4100 km, practical ceiling - 7700 m, armament - ÿ gun ShVAK 20 mm caliber, 2 7.62 mm machine guns (1 - UBT and 1 - UBC) and 1000 kg of bombs. |

Characteristics of Yer-2/ACH-30B: crew - 5 people, power plant - 2 x ACh-30B with a capacity of 1500 hp each. s., wing span - 23.08 m and its area - 79.08 m ?, aircraft length - 16.58 m,

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take-off weight - 14,850 kg, maximum speed - 420 km / h, range - 5000 km, service ceiling - 7200 m, armament - ÿ ShVAK cannon caliber 20 mm, 2 machine guns caliber 7.62 mm (1 - UBT and 1 - UBC) and 1000 kg of bombs.

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I-4 (ANT-5)

In February 1926, at TsAGI, on the instructions of the Air Force, the development of the I-4 fighter began, which had the designation ANT-5 at TsAGI; at first, work was supervised by A.I. Putilov, and then P.O. Dry.

The construction of the ANT-5 prototype sesquiplane began at the end of 1926, and in August 1927 the machine entered factory tests. After a number of modifications to the aircraft at the end of 1927, it was decided to start production of the I-4 with the delivery of the first production model by November 1, 1928. But the Air Force gradually lost interest in the I-4, which was significantly inferior to the new generation fighters - I-5, I-7, and in some ways the older I-3. By the end of 1931, the production of the I-4 was stopped.

The I-4 was used for a number of interesting experiments. V.S. Vakhmistrov used it in the first version of his "Link" - two I-4s stood on the wing of the carrier TB-1, and the lower wings of the biplanes were removed, which had almost no effect on their flight characteristics. In 1931, work began on equipping the I-4 with APK-3 dynamo-reactive cannons of 65 mm caliber.

In May 1933, the I-4 No. 1649 aircraft with two APC-3s installed under the upper wing was put to the test. Ground tests were carried out with charges of different power. When using charges weighing 425 g, destruction of the fuselage skin was noted - outgoing gases literally “sucked” it from the structure.

During flight firing on May 18, 1933, a shot in the air led to the rupture of the barrel of the right gun and the formation of a ragged hole in the wing with an area of more than 0.5 m². The pilot managed to land the damaged fighter at the airfield. Although tests of the I-4 with APK-3 continued, however, the issue of mass rearmament of the fighter was no longer raised. L.V. Kurchevsky proposed to equip the I-4 with a 67 mm smooth-bore APC firing buckshot, but this proposal did not arouse interest, and it was proposed to arm the I-4 fighter with the first Soviet RS-82 rockets.

During firing, the projectiles were fired from tubular guides above the upper wing of the aircraft. In 1935-1936. I-4 fighters were also tested with experimental powder boosters designed by RNII. By 1935, I-4s were already completely outdated and were withdrawn from service, a total of 349 copies of I-4s were built.

Characteristics of the I-4: crew - 1 person, power plant - 1 x M-22 with a capacity of 480 hp. s., upper wing span - 11.4 m, lower wing span - 2.5 m, wing area - 23.8 m?, aircraft length - 7.28 m, empty weight - 978 kg, takeoff weight - 1430 kg, maximum speed - 231 km/h, range - 840 km, rate of climb - 555 m/min, service ceiling - 7000 m, armament - 2 PV-1 machine guns of 7.62 mm caliber.

I-5

In 1929, under the leadership of N.N. Polikarpov, the development of the I-5 biplane fighter began, and in April of the following year, flight tests began on three prototypes of the fighter, which differed primarily in the type of engine. Based on the results of factory tests, it was decided to start mass production of the fighter, in 1931 the first vehicles began to enter combat units.

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In the 1930s I-5 was one of the main fighters of the Red Army Air Force. In 1933-1934. I-5 fighters were tested as part of "Link-1a" (TB + 2 I-5) and "Link-2" (TB + 3 I-5) V.S. Vakhmistrov.

I-5 fighters were among the first Soviet aircraft to take part in combat operations against the Japanese in 1939 and in the Soviet-Finnish war of 1939-1940. A small number of vehicles fought in Ukraine at the very beginning of the Great Patriotic War as fighter-bombers capable of carrying two bombs under the fuselage. From the very first days of the war, I-5 aircraft of the Black Sea Fleet Aviation, for example, the 11th Fighter Regiment, based in the Crimea, took part in the hostilities. The total number of built machines for the entire period of mass production amounted to 803 copies.

Characteristics of the I-5: crew - 1 person, power plant - 1 x M-22 with a capacity of 480 liters. s., upper wing span - 9.65 m, lower wing span - 7.02 m, wing area - 21.0 m?, aircraft length - 6.81 m, height - 3.0 m , empty weight - 943 kg, takeoff weight - 1335 kg, maximum speed - 280 km/h, range - 660 km, rate of climb - 535 m/min, service ceiling - 7500 m, armament - 2 PV-I machine guns of caliber 7.62 mm.

I-14 (ANT-31)

The I-14 (ANT-31) fighter, the first single-seat fighter in the USSR with a retractable landing gear, was also developed for the installation of dynamo-reactive cannons of the agro-industrial complex. Design and construction were carried out in 1932-1934. in TsAGI by P.O. Sukhoi under the general guidance of A.N. Tupolev.

The first experimental aircraft powered by a Bristol-Merkur U52 engine with 500 hp. With. was released in May 1933. The armament of the aircraft consisted of one PV-I machine gun and two APK-11 cannons of 37 mm caliber under the wing. A second armament option was also considered - two ShVAK cannons, two PV-| and four D-I holders for hanging bombs. During the tests, the aircraft showed good data, however, it was noted that the aircraft was very strict in control.

The second prototype I-14bis (ANT-31bis) with a more powerful Wright-Cyclone engine was tested in March--

October 1934, had weapons - two APK-37. In the series, the aircraft began to be built with the Wright-Cyclone engine, but then the imported engine was replaced by the domestic serial M-25 engine. In this version, the aircraft was equipped with two APK-11 cannons and two ShKAS machine guns. With the advent of the I-16 fighter, the I-14 aircraft lost its significance, since it was inferior to the I-16 aircraft in flight qualities, having the advantage only that it was more stable in turns. 55 I-14 aircraft were under construction, of which they were completed and handed over to the air unit in 1936-1937. only 18 aircraft, the rest were not completed.

Characteristics of I-14bis (ANT-31bis): crew - ÿ person, power plant - | x "Wright Cyclone" with a capacity of 712 liters. s., wingspan - 11.2 m and its area - 16.9 m?, aircraft length - 6.1 m, empty weight - 1170 kg, take-off weight - 1540 kg, maximum speed - 449 km/h, rate of climb - 769 m / min, service ceiling - 9430 m, armament - 2 APK-11 guns of 37 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

I-15/I-153 Chaika

In February 1933, the design team headed by N.N. Polikarpov, started work on the I-15 biplane fighter project, and already in October, test pilot V.P. Chkalov lifted the car into the air for the first time. The aircraft, equipped with the M-22 engine, was put into series production. I-15 fighters began to enter the combat units in 1935.

The I-15 fighter was very maneuverable, which earned him well-deserved fame among the pilots. Test pilot V.K. Kokkinaki November 21, 1935 established

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the world record for climbing to a height without a load is 14,675 m. In 1937, a modernized version of the I-15bis (I-152) machine with a slightly modified upper wing, a more powerful M-25V engine and reinforced armament went into production. During the period from 1937 to 1939, 2408 machines of this modification were built.

By the end of October 1936, the first 25 I-15 fighters with M-22 engines arrived in Spain, and already on November 4, Major Pavel Vasilievich's squadron over the suburbs of Madrid

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Rychagova (1911-1941), who in February 1941 became Deputy People's Commissar for Defense of the USSR, entered into an air battle with German Heinkel He 51 fighters from the Condor Legion and shot down 4 of them. On the same day, I-15 fighters shot down

Three more Italian Fiat S.K.32 fighters and one Junkers Ju 52 bomber.

In addition to Soviet and Spanish pilots, volunteer pilots from other countries also fought on the I-15. For example, several Americans, two Frenchmen and one Belgian successfully fought on these fighters in the squadron of Ezsiadgsha Gasape. The American F. Tinker, for example, shot down three He 51, three S.K.32 and two BE 109 aircraft, and his compatriot A. Baumler - two He 51 and three S.K.32. On July 8, 1937, the Yugoslav volunteer B. Petrovich destroyed one V! 1098, and on February 6, 1939, the Spaniard J. Falco shot down two BE 109B.

On October 15, 1937, two squadrons of I-15 Republicans raided the air base in Garapilinos, destroying a large number of enemy bombers and fighters, fuel and ammunition depots, and several buses with summer staff on the ground. On the night of October 25, 1937, Lieutenant E.N. Stepanov on the I-15 fighter for the first time in the world made a night aerial ramming, destroying the Italian bomber "Savoy Marchetti" S.M.81.

I-15s fought almost until the end of the Spanish Civil War. Among the Spanish pilots, the most productive was the commander of the 2nd squadron of I-15 fighters L. Rubio, who scored 21 victories. Among the pilots who won from 5 to 8 or more victories were: Spaniards A. Lacalle and M. Sambudio, Americans A. Baumler, J. Peck, O. Bell and G. Dahl, Austrians G. Dobias and V Corrows, Serb B. Petrovich, Soviet volunteers A. Serov, M. Yakushin, P. Rychagov, E. Stepanov, E. Kondrat, A. Osipenko, A. Osadchiy, A. Kovalevsky, G. Zakharov, V. Turzhansky and others. In December 1938-January 1939, the first batch of 31 I-15bis fighters appeared in the aviation units of the Republicans.

At the end of 1937, a batch of 93 I-15bis fighters was transferred to the central government of China, and in the very first air battles, Soviet fighters showed their superiority over the Japanese Kawasaki Ki-10 biplane fighters. However, the Japanese soon had

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fighters "Mitsubishi" A5M and "Nakajima" Ki-27, superior to I-152 in speed, horizontal maneuverability, rate of climb. Nevertheless, in a number of battles, Soviet and Chinese pilots successfully fought the enemy outnumbered. So, for example, on February 18, 1938, reflecting on

years on Wuhan, the Chinese on the I-15 and I-16 shot down up to 11 Japanese fighters and bombers, losing 5 of their vehicles. On April 29, in the Hankow region, Soviet and Chinese pilots, intercepting a group of 30 Japanese bombers, shot down 21 enemy vehicles, and on May 31 another 8 enemy vehicles were shot down here.

I-15 fighters took part in the fighting in the area of Lake Khasan in August 1938. The enemy had no aircraft, so I-15s were used to attack the Japanese ground forces. In the fighting in the area of Khalkhin Gol, the I-15 had to fight with the Ki-27, the main fighter of the imperial Kwantung Army. A regiment of I-15bis fighters intercepted Japanese bombers. On June 22, 1939, in an air battle, 95 I-15bis and I-16 fighters were opposed by 120 Japanese fighters, as a result of which our losses amounted to 14 aircraft, and the Japanese lost 34 aircraft. After the first serious losses, the I-152s were transferred to the role of attack aircraft, with which they coped well.

During the Soviet-Finnish war in November 1939 - March 1940, the main task of the I-15 and I-152 was to carry out assault strikes against enemy ground forces. In addition, they were involved in the delivery of goods to their encircled units. Cargo was transported in soft containers, which were hung under the lower wing of the aircraft.

N.N. Polikarpov in 1938 created a more advanced modification of the aircraft under the designation I-153 "Seagull". The scheme of the new fighter and its main dimensions remained the same, but it had a retractable landing gear in flight, a more powerful engine, the entire structure of the aircraft was reinforced, and the back of the pilot's seat was armored. The I-153 aircraft became the last biplane fighter in the USSR, built in large series, a total of 3437 aircraft of this type were built.

In the summer of 1939, I-153 fighters took part in combat operations during the Soviet-Japanese conflict in the Khalkhin-Gol region. The total number of fighters that arrived in Mongolia amounted to 70 copies, in air battles and accidents the Soviet group lost 23 I-153 fighters.

"Seagulls" had to take part in the Soviet-Finnish war. On these machines, our pilots in the first period

During the Great Patriotic War, when there were still not enough aircraft of new types, they successfully fought air battles, stormed enemy convoys, airfields. So, already on June 22, I-152s and I-16s from the 97th squadron of the Danube Flotilla shot down 5 out of 9 enemy planes while repelling a Romanian air raid on Izmail. Junior Lieutenant V.S. On July 13, 1941, Adonkin from the 72nd Combined Aviation Regiment (6th Fighter Aviation Division, Air Force of the Northern Fleet) rammed an enemy bomber on an I-153 and landed his aircraft safely. Commander of the 87th Separate Air Squadron of the Azov Flotilla Captain G.I. Agafonov, while repelling Luftwaffe air raids on Mariupol on October 7, 1941, shot down two BE 110 and two ÿi 88 during two sorties. Most likely, Senior Lieutenant A.G. Mironenko from the aviation of the Baltic Fleet, who accounted for 9 aircraft shot down on the I-152.

But for the most part, the I-15 and I-153 were used as attack vehicles, mainly as attack aircraft, and also as night bombers. The planes were on the fronts

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until the middle of 1943, and in the air defense system they were still used in 1944. They were also used in large numbers for training pilots.

Characteristics of the I-15: crew - 1 person, power plant - | x M-22 with a capacity of 480 liters. s., upper wing span — 9.75 m, lower wing span — 7.5 m, wing area — 21.9 m", length — 6.1 m, empty weight — 1106 kg, takeoff weight — 1415 kg, maximum speed — 350 km/h, range — 500 km, rate of climb — 454 m/min, service ceiling — 7520 m, armament — 2 PV-1 machine guns of 7.62 mm caliber.

Characteristics of the I-153: crew - 1 person, power plant - I x M-62 with a capacity of 800 hp. s., span of the upper wing - 10.0 m, span of the lower wing - 7.5 m, wing area - 22.1 m?, length - 6.18 m, height - 3.0 m, empty weight - 1348 kg, takeoff weight - 1859 kg, maximum speed. — 444 km/h, rate of climb — 943 m/min, practical ceiling — 11,000 m, armament — 4 ShKAS machine guns of 7.62 mm caliber.

Characteristics of the Ki-27a (for comparison): crew - 1 person, power plant - 1 x Na-No. with a capacity of 710 hp. With.,

wingspan - 11.3 m, its area - 18.55 m?, aircraft length - 7.53 m, height - 3.25 m, empty weight - 1110 kg, maximum takeoff weight - 1790 kg, maximum speed - 470 km / h, range - 1710 km, rate of climb - 933 m / min, practical ceiling - 12,250 m, armament - two 7.7-mm machine guns type 89.

Characteristics of the A5M4 (for comparison): crew - 1 person, power plant - ÿ x "Kotobuki" -41 with a capacity of 785 liters. s., wing span - 11.0 m, its area - 17.8 m?, aircraft length - 7.57 m, height - 3.27 m, empty weight - 1216 kg, takeoff weight - 1671 kg, maximum speed - 430 km / h, range - 1200 km, rate of climb - 588 m / min, practical ceiling - 9800 m, armament - two 7.7-mm machine guns type 89 and two 30-kg bombs.

I-16

In 1933, under the leadership of N.N. Polikarpov developed the design of the TsKB-12 monoplane fighter. Tests of the prototype fighter, which received the designation I-16, were carried out by test pilot V.P. Chkalov.

Serial production of I-16 aircraft with the M-22 engine began in 1934, the maximum speed of these machines did not exceed 360 km/h. But in the process of production, there was a continuous improvement in the design of the fighter. Therefore, for example, vehicles manufactured in 1939, equipped with the M-62 engine, developed a maximum speed of up to 490 km/h and had a fairly powerful armament of two cannons and two machine guns.

By the end of 1936, the aviation of the Spanish Republicans had 62 I-16 type 5 fighters, initially only Soviet pilots flew them, successfully operating against Franco aircraft. One of our aces, Sergei Ivanovich Gritsevets (1909-1939), who flew the I-16, according to official data, won 30 personal victories and 7 victories in the group, in February 1939 he was awarded the title Hero of the Soviet Union. behind. Since May 1937, Spaniards and internationalist pilots from other countries began to fly these fighters, for example, the Americans F. Tinker and A. Baumler mentioned above.

During 1937, the first I-16 Type 5 fighters began to arrive in China as part of the 4th Fighter Group. Soon they were joined by I-16 type 6 fighters.

I-16 type 29

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I-16s of later modifications took part in combat operations against the Japanese in the area of Khalkhin Gol. Here on May 29, 1939, a group of 48 experienced pilots arrived under the command of Yakov, Deputy Head of the Red Army Air Force

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Vladimirovich Smushkevich (1902-1941). This group included many Heroes of the Soviet Union who had combat experience in the skies of Spain and China, among them was S.I. Gritsevets. The main task of the group was to gain air superiority, previously captured by Japanese aircraft. Near Khalkhin Gol S.I. Gritsevets made 138 sorties, participated in 30 air battles against Japanese aircraft. On June 26, during an air battle, S.I. Gritsevets landed his I-16 not far from the plane of his unit commander, Major V. Zabaluev, who fell due to an engine failure deep in enemy territory. Taking his commander, S.I. Grits vets took him to the location of his unit. For saving his commander from captivity and other heroic deeds on August 29, 1939, Major S.I. Gritsevets was awarded the title twice Hero of the Soviet Union. Together with G.P. Kravchenko, he became the first of the twice Heroes of the Soviet Union. For the entire time of air battles at Khalkhin Gol (June-August 1939) S.I. Gritsevets personally shot down 11 aircraft.

I-16 fighters participated in 1939-1940. in the Soviet-Finnish war and in the first period of the Great Patriotic War. So, for example, on the very first day of the Great Patriotic War, pilot I.A. Avekov on his I-16 shot down two German Messerschmitt BE 109 fighters, and on August 28, 1941, near the city of Konotop, he shot down two Heinkel He 111 bombers.

I-16s were used as part of the SPB (composite dive

first bomber - the carrier aircraft TB-3 and two I-16s, which were suspended under the wing of the carrier), this bunch destroyed in 1941 the Chernavodsky bridge (Romania) across the Danube. In total, 8194 I-16 aircraft of various types were produced, by the beginning of the Great Patriotic War they accounted for almost half of the entire fighter force of the Red Army aviation, remained in service until 1944. 2 Characteristics of the I-16: crew — | man, power plant — I x M-63 with a capacity of 1100 liters. s., wing span - 9.0 m and its area - 14.54 m?, empty weight - 1500 kg, takeoff weight - 1941 kg, maximum speed - 463 km / h, range - 700 km, practical ceiling - 9700 m, armament — 2 ShVAK cannons of 20 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber or 4 ShKAS machine guns of 7.62 mm caliber and 1 BS machine gun of 12.7 mm caliber, 6 NURS RS-82 and 200 kg of bombs.

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Characteristics B? 1096-2 (for comparison): crew - | man, power plant — 1 x OV 605A-1 with a capacity of 1475 hp. s., wing span - 9.9 m and its area - 16.2 m?, aircraft length - 8.85 m, height - 2.5 m, empty weight - 2255 kg, maximum takeoff weight - - 3200 kg, maximum speed - 635 km / h, practical ceiling - 12,000 m, range - 545 km, armament - 2 machine guns MS 17 caliber 7.92 mm and 1 cannon MS 151 caliber 20 mm.

I-17

In 1933-1936. in the Design Bureau N.N. Polikarpov worked on the creation of a fighter capable of reaching a maximum speed of 500 km/h. There were no domestic engines of suitable power capable of providing such a speed at that time, therefore, for the I-17 fighter (TsKB-15), they chose the Hispano-Suiza 12 ubg engine with a power of 750 hp. With.

A prototype of the I-17 aircraft appeared in September 1934; it carried two ShKAS machine guns or two ShVAK cannons and 50 kg of bombs as weapons. During flight tests, it turned out that it was superior to the I-16 fighter in terms of stability and controllability, but its maximum speed did not exceed 424 km/h. 4

The second experimental aircraft I-17 (TsKB-19) was equipped with the M-100 engine (licensed reproduction of the Hispano-Suiza engine) and was armed with four machine guns.

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ShKAS in the wing and could carry 100 kg of bombs. During flight tests in 1935, V.P. Chkalov achieved a maximum speed of 485 km/h and a practical ceiling of 9700 m on it. The firing results were very good, especially against ground targets. | In May 1936, the aircraft was successfully shown at an air parade, and in 1937 it was demonstrated at aviation exhibitions in Paris and Milan.

The third prototype I-17 (TsKB-33) was a modification of the second prototype aircraft with three ShKAS machine guns. During the tests, it showed a speed of over 500 km / h, but could not be accepted as a fighter due to the low survivability of the engine cooling system. The I-17 fighter was not approved for production.

On the basis of the TsKB-33 project, a portable fighter project was developed, adapted for
hanging it under the plane

carrier TB-3. It was a cannon fighter without conventional take-off and landing devices, since it was supposed to start from a carrier and land on the ground. The armament of this modification consisted of two ShKAS machine guns and one ShVAK cannon or three ShVAK machine guns. The wing area was only about 9.0 m², the estimated maximum speed was 575 km/h. However, the project was not implemented.

Characteristics of I-17 (TsKB-19): crew — 1 person, power plant — | x M-100 with a capacity of 750 liters. s., wing span - 10.0 m and its area - 17.65 m?, length - 7.37 m, height - 2.55 m, empty weight - 1560 kg, takeoff weight - 1916 kg, maximum speed - 485 km/h, range — 800 km, rate of climb — 694 m/min, service ceiling — 9700 m, armament — 4 ShKAS machine guns of 7.62 mm caliber and 100 kg of bombs.

I-21

In January 1940, under the leadership of Mikhail Mikhailovich Pashinin, in 1931-1934. who worked as a member of the MAI student group on the creation of the Stal-MAI aircraft, later deputy N.N. Polikarpov, the development of the I-21 fighter (IP-21 - dive fighter) with the M-105P engine, capable of reaching a speed of 950 km/h in a dive, began.

The experimental machine was ready for the summer, its first flight took place on July 11, 1940, and on August 18 it took part in the air parade in Tushino. During subsequent factory tests, the aircraft crashed, after which it was not restored. In October, the second prototype, armed with one ShVAK cannon and two ShKAS machine guns, began flight tests, however, according to the results of state tests, it was recommended to modify the aircraft.

The modified third copy, which had more powerful armament, took off for the first time on April 5, 1941, demonstrated high speed and aerobatic properties in tests, but the problems that arose during the landing of the aircraft were not eliminated. Under the conditions of the outbreak of war, further work on the I-21 was stopped, since all efforts were focused on the serial production of Yak, LaGG and MiG fighters.

Characteristics of the I-21 (M 3): crew - 1 person, power plant - I x M-105P with a capacity of 1050 liters. s., wingspan - 9.4 m and its area - 15.46 mg, length - 8.29 m, take-off weight - 2670 kg, maximum speed - 580 km/h, range - - 760 km, climb rate - 996 m/min, practical ceiling - 10,600 m, armament - 1 MP (or VYa) cannon of 23 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

I-28

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In the spring of 1938, the Design Bureau of V.P. Yatsenko, who previously worked with N.N. Polikarpov, and then with S.A. Kocherigin on the DI-6 aircraft, began work on the I-28 fighter with the M-90 engine. In June 1939, the first prototype aircraft equipped with the M-87A engine began flight tests due to delays in the development of the M-90 engine. During the tests, the aircraft developed a maximum speed of 545 km/h and reached a practical ceiling of 10,500 m.

During a test flight on July 4, an accident occurred. When working out the dive mode, the engine hood was destroyed, a piece of which destroyed the tail unit. Nevertheless, the test pilot managed to land with a parachute. The second experimental machine, equipped with the M-88 engine, tested from April 20 to May 15, 1940, during the tests showed a maximum speed of 566 km / h. According to the test results, an experimental series of 30 aircraft was ordered, but after the construction of the first five aircraft, the program was terminated.

Characteristics of the I-28 (No. 2): crew - 1 person, power plant - I x M-88 with a capacity of 1000 liters. s., wing span - 9.6 m and its area - 16.5 m2, length - 8.54 m, takeoff weight - 2730 kg, maximum speed - 566 km / h, range - 450 km, rate of climb - 820 m / min, practical ceiling - 10,800 m, armament - 1 ShVAK cannon of 20 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

I-110

Single-seat fighter I-110 with an M-107P engine of 1400 hp. With. was developed under the leadership of Dmitry Ludvigovich Tomashevich, in the 1920s. who worked with K.A. Kalini

nym, as 1934 - with N.N. Polikarpov in his design bureau (in 1936 he was appointed deputy to N.N. Polikarpov). D.L. Tomashevich was unreasonably repressed and, being imprisoned, in 1939-1941. worked in TsKB-29 NKVD.

The fighter had powerful weapons - one ShVAK cannon, two UBS machine guns and two ShKAS machine guns. In addition, suspension units for 500 kg bombs were provided on the aircraft. The peculiarity of the design of this aircraft is its division into parts, assemblies and assemblies connected without fitting: the propeller group with a radiator, hoods and equipment was attached at four points; cockpit consoles, fully assembled, were fastened at three points, etc. Flanged connections were widely used, which greatly facilitated the process of assembling the aircraft on a conveyor.

At the end of 1942, the prototype made its first flight, during the tests it demonstrated fairly high flight characteristics, but due to its large weight, its rate of climb was insufficient. The I-110 did not go into serial production, because even after the comments of the testers were eliminated, it did not have significant advantages over the fighters already put into service.

It should be noted that at the beginning of 1943, the German company Messerschmitt developed a project for the “modular” aircraft Me P.1090, which, according to the concept, repeated the fighter D.L. Tomashevich cha. Until the end of the war, the Germans managed to build only a full-size wooden mock-up of a “modular” aircraft.

Characteristics of the I-110: crew - 1 person, power plant - I x M-107A with a capacity of 1650 liters. s., wingspan -

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10.2 m and its area - 18.73 m?, length - 9.91 m, height - 2.8 m, empty weight - 3285 kg, takeoff weight - 3980 kg, maximum speed - 610 km/h , range - 1050 km, lift soon - 750 m / min, practical ceiling - 10,000 m, armament - 1 ShVAK cannon of 20 mm caliber, 2 UBT machine guns of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber and 500 kg.

I-180

To replace the I-16 fighter under the leadership of N.N. Polikarpov in 1938, the development of the I-180 fighter with the M-88 engine began. The first prototype I-180-1, equipped with four ShKAS machine guns, was first taken into the air on December 15, 1938 by test pilot V.P. Chkalov. A catastrophe occurred due to an engine stop in flight, V.P. Chkalov died.

The second prototype I-180-2 with the M-87 engine was undergoing flight tests from April to September 1939, the development of serial production of the aircraft began in August. On February 10, 1940, the third prototype I-180-3 with the M-88R engine, two ShKAS machine guns and two BS machine guns began testing. By May 1, 1940, ten experimental batch aircraft were launched, three of them were shown at the May Day parade, but after that, work on the I-180 was stopped.

I-180-3 with sliding canopy

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Characteristics of the I-180: crew - 1 person, power plant - 1 x M-99R with a capacity of 1100 hp. s., wing span - 10.0 m and its area - 16.11 m ?, length - 6.88 m, height - 2.45 m, empty weight - 1815 kg, take-off weight - 2675 kg, max. maximum speed - 585 km/h, range - 900 km, rate of climb - 1000 m/min, service ceiling - 11,050 m, armament - 2 ShKAS machine guns of 7.62 mm caliber and 2 BS machine guns of 12.7 caliber mm.

I-185

_ Instead of the I-180 in the Design Bureau N.N. Polikarpov in 1940, work began on the I-185 fighter, it was five experimental vehicles were built, differing mainly in engine and armament. The plane with the M-81 engine, armed with four machine guns, made its first flight on January 11, 1941, but in May, due to insufficient power, the M-81 engine was replaced by the M-71 engine. The second vehicle had an M-82 engine and was armed with three guns. Both machines successfully passed state tests, as well as military tests on the Kalinin Front in November 1942. Based on the test results, it was recommended to start serial production of the I-185 aircraft with the M-71 engine and three-gun armament. However, it was not possible to launch the aircraft into a series, since there was no mass production of the M-71 engine.

Characteristics of the I-185: crew - 1 person, power plant - 1 x M-71 with a capacity of 2000 liters. s., wing span - 9.8 m and its area - 15.53 m?, length - 8.05 m, height - 2.5 m, empty weight - 2709 kg, takeoff weight - 3119 kg , maximum speed - 680 km / h, range - 800 km, rate of climb - 1063 m / min, service ceiling - 10,025 m, armament - three ShVAK guns of 20 mm caliber, 500 kg of bombs or eight RS-82.

I-190

In December 1937, the leadership of the Air Force decided to develop improved biplane fighters. In accordance with this decision of KB N.N. Polikarpov began work on the modernization of the I-153 fighter, the new machine, equipped with the M-88 engine, received the designation

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I-190

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nie I-190. It was assumed that the I-190 would be used as a fighter, attack aircraft or escort fighter.

Due to engine problems and a lack of production capacity, the first prototype was completed in October 1939 and first flew on 30 December. Flight tests, during which various engines (M-88, M-88R, M-88A) and propellers were tested, continued for 1940 tons and ended in February 1941, when the machine was damaged during landing. On this, all work on the I-190 ended.

_ Characteristics of the I-190: crew - 1 person, power plant - | x M-88 with a capacity of 1100 liters. s., span of the upper wing - 10.0 m, span of the lower wing - 7.5 m, wing area - 24.83 m?, length - 6.48 m, height - 3.55 m, empty weight - 1705 kg, takeoff weight - 2290 kg, maximum speed - 488 km / h, range - 720 km, rate of climb - 847 m / min, service ceiling - 12,400 m, armament - 4 ShKAS machine guns of 7.62 mm caliber and 200 kg of bombs.

I-207

In 1936, under the leadership of Alexei Andreevich Borovkov and Ilya Florentievich Florov, later head of the Design Bureau, the development of a biplane fighter began. In May 1937

A prototype machine under the designation M 7211 began flight tests. During one of the flights, on June 21, an accident occurred due to engine failure, during which the test pilot died.

However, work on the aircraft soon resumed, in the second half of 1939 two aircraft were ready - the I-207/1 with the M-62 engine and the I-207/2 with the M-63 engine. Both aircraft had a non-retractable landing gear, they differed from the Ho 7211 in a longer fuselage, a fixed cockpit canopy and many design improvements, the armament consisted of four ShKAS machine guns.

The I-207/1 made its first flight on June 29, 1939, during the tests it turned out that it was comparable in its characteristics to the I-153 fighter. This aircraft took part in the combat actions of the Soviet-Finnish war of 1939-1940. I-207/2 was tested until May 22, 1940, its maximum speed was lower than that of I-207/1. In November 1939, the I-207/3 with a retractable landing gear was ready, which managed to reach a maximum speed of 486 km/h during testing. It was supposed to put the M-64 or M-65 engine on the I-207/4, which made it possible to reach a maximum speed of 550 km/h.

The development of the I-207/4 was completed by May 1, 1940, but by that time the I-207 fighter had already been reoriented to perform the tasks of a dive bomber, since during the war with Finland there was an urgent need for such a machine capable of Noah to destroy long-term defensive structures. Therefore, the I-207 / 3 was urgently finalized by installing bomb holders for the suspension of two FAB-250s under the lower wing. The aircraft was tested in September-October 1940. During the tests of the I-207/3, K.E. Voroshilov, who liked the plane, and he promised to achieve a decision on the construction of a serial batch of 200 aircraft. Contrary to the promises of K.E. Voroshilov, the I-207 dive bomber did not go into production due to the short flight range, which at that time was considered a big drawback for bombers. After that, the design bureau returned to work on the I-207/4, having made a prototype in the spring of 1941, but all work ended on it. |

Characteristics of the I-207: crew - 1 person, power plant - I x M-63 with a capacity of 1000 hp. s., wingspan - 6.98 m

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and its area - 18.0 m?, length - 6.34 m, height - 3.46 m, empty weight - 1521 kg, takeoff weight - 1879 kg, maximum speed - 486 km/h, range - 640 km , rate of climb - 1087 m / min, service ceiling - 10,200 m, armament - 4 ShKAS machine guns of 7.62 mm caliber.

AND 2

In 1928, Dmitry Pavlovich Grigorovich, who created a number of sea and land-based aircraft, was unjustifiably repressed and, being imprisoned, from 1928 to 1931 worked at TsKB-39 of the OGPU. There, in 1930, he began the development of the I-7 (I-ZET) fighter for the installation of two dynamo-active cannons APC-4 of 76 mm caliber.

One of the first production I-7s (No. 39 009) with the M-22 engine was tested in February-March 1933 at a training ground in Monino, Moscow Region. The aircraft carried one active cannon under the left wing console and its mass-dimensional layout under the right. From September 14 to October 1, 1933, state tests of the second sample were carried out, armed with serial APK-4 cannons, each of which was equipped with a tubular magazine for 6 shells (and 1 shell in the barrel). Artillery armament I-4 passed the test, but the magazine capacity was assessed as unacceptably small.

_ The test report stated that I-2 type fighters could be taken on
Arming the Red Army Air Force under the following conditions: increasing the maximum speed (up to 300 km/h), the capacity of gas tanks, the number of shells (up to 20), installation of electrical equipment and radio.
A special point was the desire to increase the strength of the aircraft, since after 300-500 shots its design needed to be repaired. The Air Force wanted to bring the survivability of the I-7 up to 1000 rounds. The modified car should have been presented to | March 1934. During 1935, another 20 I-2s were manufactured, so the total output at the two plants amounted to 72 vehicles.)

In April 1935, a special air group was created consisting of an I-7 fighter unit, an R-5 unit for towing cones, and one TB-1, designed to test a 37-mm turret DRP. A special air group was sent to Evpatoria, where on May 15, 1935 it began flying. The main purpose of the tests was

determination of the survivability of I-7 fighters and possible measures to extend their service life. Shooting from the APK-4 was carried out from a dive, pitch-up, in level flight, single shots and series. After 100-150 shots, a thorough inspection of the fighter structures was carried out with the replacement, if possible, of individual parts. On average, 240 shots were fired from each gun. Significant damage was observed in the aircraft structures: riveted seams diverged, tail empennage brackets cracked, fabric covering burst. Only individual planes withstood up to 340-360 shots. It was recognized that even with appropriate structural reinforcements, the service life of the I-2 when firing from dynamo-reactive guns is no more than 400 shots. By the beginning of 1936, only a few copies of the I-2 remained strictly. By that time, work on the DRP had practically been curtailed, and the use of these fighters had lost its relevance.

Characteristics of I-7.: crew - 1 person, power plant - | x M-22 with a capacity of 480 liters. s., wing span - 11.5 m and its area - 19.5 m?, length - 7.65 m, empty weight - 1140 kg, takeoff weight - 1648 kg, maximum speed - 259 km / h, range - 600 km, rate of climb - 358 m/min, practical ceiling - 7000 m, armament - 2 cannons APK-4 of caliber 76 mm and | machine gun PV-1 caliber 7.62 mm.

IL-1

In 1943, OKB S.V. Ilyushin began to develop a project for a single-seat armored fighter Il-1 with an AM-42 engine. The fighter was to be equipped with two 23 mm guns. To protect the aircraft from attacks from the rear hemisphere in the rear fuselage

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a cassette was installed in which 10 AG-2 aviation grenades were placed. After the grenade was thrown, its parachute first opened, and then it exploded, hitting the attacking enemy aircraft. If necessary, in the reloading version, the aircraft could carry 200 kg of bombs on an external sling.

The prototype fighter took off for the first time on May 19, 1944. As a result of the factory tests, it was found that in terms of its speed and maneuverability characteristics at altitudes up to 4000 m, the Il-1 significantly exceeded

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German fighter Eu / -190A-4 and was practically not inferior to the B1-1090-2 fighter. However, by the middle of 1944, the need for a combat aircraft of this type for the Soviet Air Force had already disappeared, so the Il-1 was not transferred to state tests, and further work on it was stopped.

Characteristics of IL-1: crew — 1 person, power plant — | X AM-42 with a capacity of 1750 liters. s., wing span - 13.4 m, its area - 30.0 m?, length - 11.12 m, height - 4.08 m, empty weight - 4285 kg, takeoff weight - 5320 kg, maximum speed - 580 km / h, range - 1000 km, rate of climb - 625 m / min, service ceiling - 8600 m, armament - 2 VYa cannons of 23 mm caliber and 200 kg of bombs.

IL-2

In 1938, under the leadership of S.V. Ilyushin, a project was developed for a two-seat armored attack aircraft BSh-2 (TsKB-55, DBSh) with an AM-35 engine with a power of 1350 hp. With. Its armament consisted of four ShKAS wing machine guns and one mobile machine gun in the gunner's cockpit, as well as up to 600 kg of bombs. Two prototypes of the aircraft were built, state tests of which were carried out in April 1940. During the tests, a maximum speed of 362 km/h was reached.

Then the first sample of the TsKB-55 was converted into a single-seat one and modified for the installation of an AM-38 engine with a capacity of 1600 liters. With. This experimental machine, designated TsKB-57, reached a speed of 423 km/h during trials in October 1940. The second prototype was armed with two cannons, two machine guns and eight RS-82 rockets. This machine, initially designated TsKB-55P (cannon), in January 1941 received the designation Il-2, during state tests in February-March it reached a speed of 433 km/h. In this form, the car became the benchmark for the series.

The first serial single-seat IL-2 was produced in March 1941. The IL-2 attack aircraft quickly proved their high efficiency, however, in the initial period of the war, due to the lack of escort fighters, the losses of attack aircraft were high. In February 1942, after the appropriate decision was made, they returned to the two-seater version. Two prototypes of a two-seat attack aircraft passed flight tests

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Option number 1

ARCHIVAL MATERIALS, 1943. Three-color camouflage scheme for Il-2 aircraft

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in March, from September 1942, serial production of the aircraft with the AM-38 engine began. | |

In the course of mass production, the firepower of the IL-2 was continuously increased. At the beginning of 1943, a new version of the Il-2 aircraft with a more powerful AM-38F engine, two 23-mm VA guns and rockets took part in the battles near Stalingrad. Then there were modifications with two underwing guns of 37 mm caliber. Cassettes containing up to 200 PTAB-2.5-1.5 anti-tank bombs of cumulative action became especially effective weapons against German tanks. One such bomb, weighing 1.5 kg, burned through tank armor up to 70 mm thick. When the contents of such a cassette were dropped onto a column of tanks from a height of 75–100 m, all armored vehicles that fell into a strip 15 m wide and 70 m long were put out of action.

In 1943, they tried to return to the original idea of creating a single-seat armored fighter. The new modification, which received the designation Il-2I "Bomber Fighter", was a single-seat Il-2 with an AM-38F engine, converted from a conventional serial two-seat attack aircraft. Its wing was strengthened, bomb armament was removed, and two VYa cannons were left. The Il-2I prototype passed state tests in July 1943, but the aircraft was not accepted into production. It turned out that it can only be used to combat certain types of enemy bomber and transport aircraft, which have relatively low speeds (Ne PT, Em 200, ÿi 87, ÿi 52) at altitudes below 4000 m, and to actively fight against fighters the enemy aircraft cannot.

Since the summer of 1943, the Il-2KR artillery spotter was produced in small batches, which outwardly differed from the usual Il-2 by a stable radio antenna, transferred to the pilot's canopy. A more powerful radio with a greater range was installed in the cockpit behind the pilot's armored back, on a reduced fuselage gas tank. In addition, photographic equipment was installed in the rear fuselage.

Naval aviation used the Il-2, including a specialized modification of the Il-2T torpedo bomber, for anti-ship operations, for reconnaissance and for setting smoke screens. Produced educational

training version of the aircraft under the designations U-IL-2 or Il-2U. In the last year of the war, Il-2s were in service with the Polish and Czechoslovak aviation units that fought as part of the Red Army against the Germans. Il-2 attack aircraft remained in service with the Soviet aviation, as well as the aviation of the Warsaw Pact countries (Poland, Czechoslovakia, East Germany) for several post-war years. The total number of produced Il-2 aircraft of all modifications was 36,163 units.

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Characteristics of IL-2: crew - 2 people, power plant - | x AM-38F with a capacity of 1720 liters. s., wing span - 14.6 m, its area - 38.5 m?, length - 11.6 m, height - 4.17 m, empty weight - - 4525 kg, takeoff weight - 6360 kg, maximum speed - 414 km / h, range - 765 km, rate of climb - 250 m / min, practical ceiling - 6360 m, armament - 1 VYA-23 cannon of 23 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber, 1 UBT machine gun of 12 caliber .7 mm, 8 NURS RS-82 and 1000 kg of bombs.

IL-6

In the middle of 1942, in the design bureau of S.V. Ilyushin, the development of a long-range bomber to replace the Il-4 began. The new bomber, which received the designation Il-6, was originally supposed to be equipped with two ASh-71 (M-71) engines with a power of 2000 hp each. With. The IL-6 was larger in size than its predecessor, and also featured a new wing design with an increased sweep along the leading edge and an almost straight trailing edge. The Il-6 crew consisted of six people: a navigator, first and second pilots, a radio operator and two air gunners. The pilots were placed in the cockpit nearby. The armament consisted of five ShVAK cannons of 20 mm caliber - one cannon in the forward part of the fuselage near the navigator, two on the sides, one in the upper turret mount and one in the lower hatch mount. Inside the bomb bay it was possible to place a bomb load of up to 2000 kg, on the outer pylons it was possible to hang two torpedoes or two 1000 kg bombs.

During construction, the first two prototypes, by order of the Air Force, were equipped with diesel engines by A.D. Charomsky ACh-30B. The first flight of the Il-6 took place on August 7, 1943. Tests showed that the power of the ACh-30B engines for such

the machine is insufficient, so it was necessary to lighten the aircraft by removing weapons and armor, as well as reducing the crew to five people. In the summer of 1944, the prototype was re-equipped with ACh-30BF diesel engines, which developed a power of 1900 hp at an altitude of 6000 m. With. The installation of more powerful engines made it possible to return weapons and armor to the aircraft. With the new engines, the IL-6 prototype improved its performance during factory tests: the maximum speed was 464 km/h, the flight range at a cruising speed of 340 km/h with a bomb load of 1000 kg was 5450 km, the service ceiling was 6200 m.

The aircraft with new diesel engines was again sent for state tests at the FRI. But it soon became obvious that by the end of the war with Germany the plane would not have time to be put into operation, so the program was cancelled.

Characteristics of IL-6: crew - 6 people, power plant - 2 x ACh-30BF with a capacity of 1900 hp each. s., wingspan - 26.07 m and its area - 84.8 m?, aircraft length - 17.38 m, height - 4.2 m, empty weight - 11,930 kg, take-off weight - 16,100 kg , maximum speed - 464 km / h, range - 5450 km, practical ceiling - 7000 m, armament - 5 ShVAK guns of 20 mm caliber, 2 torpedoes or 4500 kg of bombs.

IL-8

In the summer of 1942, in the design bureau of S.V. Ilyushin, the development of a heavy attack aircraft-bomber Il-8, equipped with an AM-42 engine, began. According to the layout scheme, the IL-8 resembled the somewhat enlarged IL-2, but with improved external aerodynamics, enhanced armor and an increased bomb load. The armament of the aircraft consisted of two VYa-23 cannons, two ShKAS machine guns and one UBG. In addition, it was possible to install two large-caliber NS-37 cannons in the aircraft wing instead of VYa cannons. 600 kg of bombs were placed in four bomb bays, and bombs weighing up to 500 kg could be additionally hung on two external holders.

The Il-8 was developed in two versions - an attack-bomber with a flight range of about 1100 km and a reconnaissance spotter with a slightly shorter flight range, but with more

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powerful radio communication equipment.

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- The first flight of the experimental aircraft took place on May 10, 1943, its flight characteristics turned out to be good, but the factory tests of the aircraft were delayed due to unreliable operation of the engine. During testing, five engines were replaced on the experimental machine before they were able to ensure their sufficiently reliable operation. In February 1944, the experimental Il-8 aircraft was handed over for state tests, according to the results of which it was recommended for mass production in the versions of attack aircraft-bomber and reconnaissance-spotter.

In order to improve the flight performance of the Il-8 aircraft, the second experimental aircraft underwent modifications to the cooling and lubrication system of the engine, armor, wing, controls, landing gear, etc. cannon UB-20, in the tail part they placed a cassette with 10 aviation grenades AG-2. The bomb load was increased: in the bomb bays - 1000 kg of bombs, on the external sling - 2 bombs of 500 kg each.

The alteration of the second experimental aircraft was completed in the autumn of 1944, on October 13 the machine made its first flight. However, the factory flight tests of the aircraft again dragged on due to the underdevelopment of the propellers, the refinement of the aircraft lasted until the end of the war. On May 27, 1945, the second experimental aircraft was handed over for state tests. According to the results of tests, the Il-8 did not go into series, since the Il-10 was already being produced, to which the Il-8 was inferior in terms of a number of flight technical data.

Characteristics of IL-8: crew — 2 people, power plant — | x AM-42 with a capacity of 1750 liters. s., wing span - 14.8 m and its area - 39.0 m?, length - 12.93 m, height - 4.2 m, empty weight - 5245 kg, takeoff weight - 7250 kg, maximum speed — 470 km/h, range — 1180 km, rate of climb — 508 m/min, service ceiling — 6800 m, armament — 2 VYa-23 guns of 23 mm caliber, 1 UBT machine gun of 12.7 mm caliber, 2 machine guns ShKAS caliber 7.62 mm, 8-12 NURS RO-132 and 1000 kg of bombs.

IL-10

To replace the Il-2 attack aircraft in 1943, OKB S.V. Ilyushin developed a new Il-10 attack aircraft with a more powerful AM-42 engine. The armament of the prototype included

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IL-10

two VYa-23 cannons, two ShKAS machine guns, a VU-7 defensive mobile unit with a Sh-20 cannon, 4 RS-82, 10 AG-2 air grenades and a bomb load of 400 kg (overload 600 kg). Flight tests of the experimental machine began at the end of April 1944, in May, three experimental machines took part in the tests.

Serial production of the aircraft was organized by August, military trials began in October, and from February 1945 the Il-10 was already in service. On production aircraft, the VU-7 mobile gunnery mount with the Sh-20 cannon was replaced by the VU-8 mount with the UB gun. By January 5, 1945, the first 45 Il-10 attack aircraft entered the combat units. The experience of combat operations has shown that the effectiveness of the IL-10 in operations against German medium tanks is much higher than that of the IL-2.

At the time of Germany's capitulation, the Air Force had 120 serviceable and 26 faulty Il-10 attack aircraft, in addition, the Navy had 12 Il-10 aircraft. By the beginning of the war with Japan, Il-10 aircraft were equipped with the 26th Assault Aviation Regiment as part of the Air Force and the Navy in the Far East. By the beginning of hostilities against Japan (August 9, 1945), the regiment had 35 Il-10 attack aircraft.

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During the first two days of hostilities, aircraft of the 26th Regiment carried out several bombing attacks on ships and transports in the Japanese ports of Racine and Yuki. On August 17, the regiment carried out attacks on railway echelons and railway lines in the area of \u200b\u200bthe city of Seishin.

The total production of Il-10 attack aircraft by the end of 1945 amounted to 2328 combat vehicles and 228 training UIL-10 (Il-10U). The production of the aircraft continued until 1955, the total number of aircraft built was 4966 copies. The IL-10 was also in service with the air forces of Bulgaria, Poland, Romania, Czechoslovakia and Yugoslavia, and the DPRK in 1950 used these aircraft during the outbreak of the Korean War.

In addition, Il-10 aircraft were built in Czechoslovakia under the designation V-33 (combat) and SV-33 (training), production in Czechoslovakia ceased in 1954, the total number of aircraft built was more than 1200 copies. Since 1955, the Il-10M aircraft began to be produced in the USSR, which until 1956 was the main Soviet attack aircraft.

Characteristics of IL-10: crew - 2 people, power plant - | x AM-42 with a capacity of 2000 liters. s., wing span - 13.4 m and its area - 30.0 m2, length - 11.12 m, height - 4.18 m, empty weight - 4680 kg, takeoff weight - 6535 kg, maximum speed height - 551 km / h, range - 1000 km, rate of climb - 515 m / min, service ceiling - 7250 m, armament - 2 VYa-23 guns of 23 mm caliber, | UB-20 cannon 20 mm caliber, 2 ShKAS machine guns 7.62 mm caliber, 8 NURS RS-82 or RS-132 and 500 kg of bombs.

IP-1

In 1934, under the leadership of D.P. Grigorovich was built fighter IP- | (cannon fighter), the main armament of which was to be two dynamo-reactive cannons APK-4 of 76 mm caliber. The wheeled chassis of the aircraft in winter could be replaced by a ski
chassis.

During state tests conducted in January-March 1935, the aircraft demonstrated high speed and maneuverability. However, in the fall, during trial operation, a number of defects were identified that required further refinement of the aircraft. After the identified defects were eliminated in 1936, IP-I was put into production. But by that time, the attitude towards dynamo-reactive guns had changed, they began to be replaced by faster-firing conventional aircraft guns of smaller caliber. In addition, during the trial operation, it turned out that in some modes the aircraft had

no tendency to stall into a flat spin. Taking into account all these circumstances, further work on the cannon fighter was stopped. In total, the air unit received 90 IP-1 vehicles.

Characteristics of IP-1: crew - | man, power plant — | x M-25 with a capacity of 700 liters. s., wing span - 10.97 m and its area - 19.98 m?, length - 7.23 m, empty weight - 1200 kg, takeoff weight - 1880 kg, maximum speed - 343 km / h, range - 1000 km, rate of climb - 574 m/min, service ceiling - 7700 m, armament - 2 APK-4 guns of 76 mm caliber and 1st ShKAS machine gun of 7.62 mm caliber.

IP

By the end of 1938, under the leadership of Vladimir Vasilyevich Shevchenko and Vasily Vasilyevich Nikitin, who had previously worked for D.P. Grigorovich and N.N. Polikarpov, a project was developed for the world's first monobiplane IS (“Joseph Stalin”), in which, after taking off from the ground, it was possible to remove not only the landing gear, but also the lower wing. At the same time, the wheels were retracted into the side niches of the fuselage, where the root part of the wing was removed with a special lifting mechanism, and the end

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end - fit into the recess of the lower part of the upper wing. This aircraft combined all the positive features of biplanes (excellent maneuverability and good takeoff and landing characteristics) and monoplanes (high flight speed).

The first prototype of a monobiplane under the designation IS-I, equipped with the M-63 engine, first took to the air on May 29, 1940, just before the start of the war, the second prototype IS-2, which was equipped with a more powerful engine M- 88. Before the start of the war, they managed to build another prototype, the IS-4 with the AM-37 engine. Compared to its predecessors, the IS-4 was structurally improved: the shape of the fuselage is more streamlined, excellent wing-to-fuselage interface, installation of a nose wheel, a streamlined cockpit canopy, etc. The machine was included in the pilot construction plan for 1941, but In wartime conditions, due to the difficulties that arose (problems with the development of engines, high complexity in production and the relative high cost of the machine), the program was curtailed.

Characteristics of the IS-2: crew - 1 person, power plant - 1 x M-88 with a capacity of 1100 liters. s., span of the upper wing - 8.6 m, wing area - 20.83 m?, length - 7.36 m, height - 2.68 m, empty weight - 1400 kg, take-off weight - 2180 kg , maximum speed - 588 km / h, range - 600 km, armament - 4 ShKAS machine guns of 7.62 mm caliber or 2 VS machine guns of 12.7 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

ITP |

In November 1940, under the leadership of N.N. Polikarpov, the development of a project for a heavy cannon fighter ITP began, the main purpose of which was to destroy enemy bombers and destroy ground targets. It was supposed to equip the fighter with one 37 mm caliber gun and two 20 mm caliber guns, and use the AM-37P or M-105P engine as a power plant. In January 1941, a prototype aircraft with the AM-37P engine was recommended for construction.

In October 1941, the first prototype of the ITP (M-1) fighter was built, which, instead of the unfinished AM-37P, was equipped with an M-107P engine with a capacity of 1400 liters. With. Flight tests of the machine were carried out in flight, in Novosibirsk, the first flight took place on February 23, 1942, in further tests, numerous engine failures were observed. Then the car was returned to Moscow, where a new M-107PA engine with a capacity of 1650 hp was installed on it. s., and the 37 mm gun was replaced by a lighter 20 mm gun. In December of the same year, the second prototype ITP (M-2) with a more powerful AM-39A engine was ready, which on November 23, 1943 took to the air for the first time. ITP tests were terminated in the summer of 1944 after the death of N.N. Polikarpov. The leadership of the aviation industry considered that by that time serial aircraft of other types with similar flight characteristics were already being produced, so the ITP did not go into series.

Characteristics of ITP: crew — 1 person, power plant — | x AM-39A with a capacity of 1800 liters. s., wing span - 10.0 m and its area - 16.5 m?, length - 9.2 m, height - 2.65 m, empty weight - 2910 kg, takeoff weight - 3570 kg, maximum speed — 655 km/h, range — 980 km, rate of climb — 835 m/min, service ceiling — 11,500 m,

1 gun Sh-37 caliber 37 mm and 2 guns ShVAK caliber 20 mm or 3 guns ShVAK caliber 20 mm, 400 kg bombs or 8 RS-82.

K-13

In 1933, the Design Bureau of Konstantin Alekseevich Kalinin, known for its K-4, K-7, K-9, K-10, K-12, etc. aircraft, received a technical assignment for the development of a long-range bomber capable of carry 1000 kg of bombs for a distance of up to 5000 km at a speed of 350 km/h. By the same

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to the terms of reference of OKB A.N. Tupolev and OKB S.V. Ilyushin were developing ANT-37 (DB-2) and TsKB-30 (DB-3), respectively.

The K-13 aircraft had a biplane horizontal and spaced vertical tail, it was equipped with two M-34 engines with a capacity of 750 hp each. With. The crew of the bomber consisted of three people: a pilot, a navigator-gunner and a rear gunner.

At the same time, the design bureau was also developing a passenger version of the aircraft under the designation K-14. The crew consisted of two people, the number of passengers was 12. According to the calculations, the car had to reach speeds of up to 429 km/h, while the landing speed was only 84.5 km/h. In December 1934, the project was submitted to the Central Jury of the All-Union competition for a high-speed passenger aircraft.

A prototype of the K-13 bomber was built in 1936 and was undergoing flight tests. However, contrary to expectations, the characteristics of K-13 turned out to be lower than those of DB-3. On the basis of the K-13, in the same year, the K-ÿÿÿ float bomber was developed with two M-85 engines with a power of 825 hp each. With. Defensive armament consisted of two ShKAS machine guns, which could carry up to 1,500 kg of bombs in the fuselage as a payload, and torpedoes and mines on hangers. The crew of the seaplane consisted of three people, it was supposed to finish the prototype by the end of 1936, and at the beginning of 1937 put it into mass production. But these plans were not destined to come true, because K.A. Kalinin was repressed on the basis of a false accusation and shot in 1938.

Characteristics of K-13: crew - 3 people, power plant - 2 x M-34 with a capacity of 750 hp each. s., wing span - 23.0 m and its area - 78.7 m?, length - 13.4 m, empty weight

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ground - 4700 kg, takeoff weight - 7600 kg, maximum speed - 407 km/h, range - 1500 km, practical ceiling - 9000 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 1000 kg bombs.

K-37 (Gu-37)

The cannon fighter K-37 (Gu-37) was a revision under the leadership of M.I. Gudkov of the serial LaGG-3 fighter with the M-105P engine, the armament of the aircraft consisted of a 37-mm cannon and two BS machine guns. The first K-37 aircraft hastily passed state tests by June 1941, by the end of the same year an experimental batch of 20 aircraft with Sh-37 guns was produced, these aircraft took part in the hostilities.

M.I. Gudkov presented two more projects in the development of K-37. The first of them was a fighter-interceptor of active air combat, armed with a Sh-37 cannon, two ShVAK cannons and two ShKAS machine guns. The expected maximum flight speed at an altitude of 5000 m is 600 km/h.

The second of these was a project for a dive tank destroyer PIT, armed with a Sh-37 cannon, two ShKAS machine guns and two 50 kg bombs. To reduce the dive speed, the aircraft was equipped with brake flaps. The maximum design flight speed with bombs is 525 km/h, diving at angles up to 75° was allowed. However, none of these projects was implemented. “

Characteristics of K-37: crew - 1 person, power plant - 1 x M-105P with a capacity of 1180 hp. s., wing span - 9.8 mi, its area - 17.62 m?, length - 8.81 m, height - 4.4 m, empty weight - 2860 kg, takeoff weight - 3240 kg, maximum speed - 548 km / h, range - 550 km, practical ceiling - 8900 m, armament - 1 Sh-37 cannon of 37 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber. |

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· KOR-1 Ship reconnaissance biplane KOR-| single-float design was developed in 1934 under the leadership of Georgy Mikhailovich Beriev, who had previously worked in the marine brigade.

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Department of the Central Clinical Hospital I.V. Chetverikov, and since 1934 the chief designer of the design bureau of marine aircraft construction. KOR-1 was intended to be based on board the ship, it took off from a catapult, and after completing the task it landed on the water, after which it was lifted aboard. For the convenience of storing the aircraft on the ship, the wing box folded back. The first flight of the experimental machine took place on September 4, 1936. A small series of reconnaissance aircraft KOR-1 (Be-2) was adopted before the war by naval aviation.

Characteristics of KOR-1: crew - 2 people, power plant - 1 x M-25A with a capacity of 715 liters. s., wingspan - 11.0 m and their area - 29.32 m ”, length - 8.67 m, height - 3.2 m, empty weight - 1800 kg, take-off weight - 2486 kg, maximum speed - 277 km / h, range - 1000 km, rate of climb - 250 m / min, practical ceiling - 6600 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 200 kg of bombs.

KOR-2/KOR-3

In 1939, under the leadership of G.M. Beriev, a project was developed for the naval reconnaissance ship KOR-2 with the M-62 engine to replace the rapidly obsolete KOR-1. The prototype of the flying boat took off for the first time on October 21, 1940, according to the test results, the aircraft was recommended for production.

Serial production of KOR-2 began in March 1941, in August the aircraft was given the designation Be-4. The first two production vehicles were tested in 1942 in evacuation. Until the end of the war, about 50 KOR-2s were built, including those with wheeled and ski chassis and missile weapons, all of which were in service with naval aviation.

Under the designation KOR-3 in 1941, a project was developed for a modified version of the KOR-2, which had one 23-mm cannon, two 7.62-mm machine guns and could carry two 100-kg bombs, but the project was not implemented.

Characteristics of KOR-2: crew - 3 people, power plant-- | x M-62 with a capacity of 1000 liters. s., wing span - 12.0 m and its area - 25.5 m?, length - 10.5 m, height - 4.05 m, empty weight - 2055 kg, takeoff weight - 2760 kg, maximum speed - height - 358 km / h, range - 1150 km, rate of climb - 420 m / min, practical ceiling - 8100 m, armament - 2 ShKAS machine guns of 7.62 mm caliber and 400 kg of bombs.

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KOR-2

Characteristics of KOR-3: power plant - | x M-62R with a capacity of 1200 liters. s., wing span - 12.0 m and its area - 24.5 m, length - 10.5 m, maximum speed - 412 km / h, range - 1070 km, practical ceiling - 10,400 m, armament — | VA cannon, 23 mm caliber, 2 ShKAS machine guns, 7.62 mm caliber, and 200 kg of bombs.

lagg-3

By the spring of 1940, under the leadership of Semyon Alekseevich Lavochkin, Mikhail Ivanovich Gudkov and Vladimir Petrovich Gorbunov, the project of the I-301 fighter was completed, the feature of which was a completely wooden structure. An experimental aircraft under the designation LaGG-1 with

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The M-105 engine, armed with one cannon and two machine guns, took off for the first time on March 30, 1940. Based on the test results, it was decided to organize its mass production at three plants: M.I. Gudkov headed production in Moscow, S.A. Lavochkin - in Gorky, and V.P. Gorbunov - in Tbilisi. Serial production began in January 1941, serial vehicles were designated LaGG-3.

In the first period of the war, LaGG-3 was one of the main front-line fighters. In the process of production, the aircraft was constantly improved, the composition of its armament changed. The most typical version of the fighter for 1941 had one cannon and three machine guns, in addition, 6-8 rockets could be hung under the wing. However, the LAGG-3 began to yield in terms of the main indicators to the new German fighters VG-109E and BE109E that appeared at the front. Therefore, the production of LaGG-3 was gradually reduced, leaving its production at the plant in Tbilisi. There, under the leadership of V.P. Gorbunov in 1942-1943. The LaGG-3 was upgraded with a more powerful M-105PF engine, the design was lightened, part of the armament was removed, the fuel supply was reduced, and aerodynamics were improved. As a result of this modernization, according to the main flight data, the LaGG-3 was practically on par with the Yak-1 and successfully participated in hostilities.

Here is one example. At the end of July 1942, senior sergeant P.K. Babailov from the 790th Fighter Aviation Regiment (219th Mixed Aviation Division, 4th Air Army, Southern Front) took off on a LaGG-3 aircraft to repel an attack on an airfield near the city of Grozny. Woz

In a stifling battle, he shot down an enemy fighter BE 109. Having used up all the ammunition, he cut off the tail unit of another BE 109 with a propeller, and landed his damaged aircraft at the airfield. During the night, technicians restored the damaged LaGG-3 (the propeller was bent and the engine hood was damaged). The next day, P.K. Babailov again participated in an air battle on it and won his third victory.

November 21, 1943 Lieutenant P.K. Babailov, already a flight commander of the same regiment, in an air battle over the Kerch Peninsula near the village of Sultanovka on a LaGG-3 fighter rammed an enemy bomber ÿo 88 with a screw on the keel, and he himself landed on a damaged aircraft.

The LaGG-3 fighter took part in the fighting on the Soviet-German front until the end of the war, and in August 1945 took part in the fighting against the Japanese. During serial production, 6528 copies were built.

Characteristics of LaGG-3 (1943 issue): crew - | man, power plant - 1 x M-105 PF with a capacity of 1210 liters. s., wing span - 9.81 m and its area - 17.62 m2, length - 8.81 m, height - 2.4 m, empty weight - 2620 kg, takeoff weight - 2990 kg, maximum speed - 592 km/h, range - 650 km, rate of climb - 892 m/min, service ceiling - 9500 m, armament - 1st ShVAK gun of 20 mm caliber and 1st ShKAS machine gun of 7.62 mm caliber.

La-5/La-7

In December 1941, under the leadership of S.A. Lavochkin, who worked as the chief designer since 1939, completed work on the modification of the serial LaGG-3 fighter with the installation

M-82 engine and more powerful weapons.: The modified aircraft under the designation La-5 went into series, and already in September 1942, fighter regiments equipped with La-5 machines took part in the battle of Stalingrad. The experience of combat use has shown that the La-5

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has advantages over the German aircraft BE 109C and Em 190A. A unique air battle with the participation of La-5 took place on June 6

1943, when Senior Lieutenant Alexander Konstantinovich Gorovets from the 88th Fighter Aviation Regiment attacked a large group of German dive bombers. A.K. Gorovets on his La-5 shot down 9 enemy planes ÿi 87 and forced the rest to retreat, dropping bombs past the target. But when he was attacked by four Ru 190s, he had already run out of ammunition, and our ace died heroically.

In the process of mass production, the aircraft was continuously modernized, already in March 1943, the La-5FN modification with the M-82FN engine with an 1850 hp power was in service. with., equipped in addition to two guns with four RS-82 rockets. In the summer of 1943, a two-seat training modification La-5UTI appeared, developed on the basis of the La-5F fighter and designed to train pilots for flights on La-5 fighters. In total, 10,000 La-5 aircraft were built in 4 modifications.

At the end of 1943, a new modification of the La-5FN fighter was released, which received the designation La-7. The aerodynamics of the aircraft improved, the total weight of the structure decreased by almost 100 kg, which made it possible to strengthen the armament of the aircraft by installing a third gun. Accepted for mass production, the La-7 in the last year of the war became one of the main front-line fighters and one of the best aircraft of the Second World War. Three times Hero of the Soviet Union Ivan Nikitovich Kozhedub, for example, flying on La-5, La-5FN and La-7 aircraft, scored 62 victories, including shooting down a German jet fighter Me 262. On La-5, La-5FN and La- 7 such aces flew; like Kirill Alekseevich Evstigneev (53 victories), Nikolai Mikhailovich Skomorokhov (46 victories), Vasily Alexandrovich Zaitsev (34 victories), etc.

The total number of La-5 and La-7 fighters of all modifications built during the war exceeded 21,000 copies. After the end of the war, several La-5UTI aircraft were in service with the Czechoslovak Air Force under the designation C5-95.

Characteristics of La-5: crew — 1 person, power plant — | x M-82 with a capacity of 1700 liters. s, wing span - 9.8 m and its area - 17.37 m?, length - 8.67 m, height - 2.54 m, empty weight - 2740 kg, takeoff weight - 3730 kg, maximum speed - 613 km / h, range - 1000 km, rate of climb - 950 m / min, service ceiling - 10,650 m, armament - 2 ShVAK guns of 20 mm caliber and 200 kg of bombs.

Characteristics of the La-7: crew - 1 person, power plant - 1 x M-82FN with a capacity of 1850 hp. s., wing span - 9.8 m and its area - 17.59 m ”, length - 8.67 m, height - 2.54 m, empty weight - 2638 kg, take-off weight - 3280 kg, maximum speed - 680 km / h, range - 990 km, rate of climb - 1110 m / min, service ceiling - 10,750 m, armament - 3 B-20 guns of 20 mm caliber and 200 kg of bombs.

LL-143

In 1943, in the Design Bureau G.M. Beriev, the development of a long-range naval reconnaissance aircraft and bomber LL-143 began. The aircraft had a two-fin plumage, a gull-type wing and was equipped with two ASh-72 engines. The prototype was built by the end of May 1945, the first flight took place on September 6, 1945, but by the end of the year the tests were stopped. The development of the LL-143 with more powerful engines was the Be-6 aircraft.

Characteristics of LL-143: power plant - 2 x ASh-72 with a capacity of 2250 liters each. s., wing span - 33.0 m and its area - 120.0 m?, length - 23.0 m, height - 7.5 m, empty weight - 15,110 kg, takeoff weight - 21,300 kg, maximum speed - 371 km/h, range - 5100 km, practical ceiling - 6000 m, armament - 3 B-20 guns of 20 mm caliber and 200 kg of bombs.

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MBR-2

The MBR-2 naval short-range reconnaissance aircraft was created by a brigade of naval aircraft of the Central Design Bureau of TsAGI under the leadership of G.M. Berieva. The car was an all-wood flying boat with one M-17 engine (VMU MP) mounted above the wing center section. The first flight of the prototype took place on May 3, 1932. According to the test results, the MBR-2 aircraft was accepted for serial construction in 1933, and it began to enter the naval aviation unit, and in 1935 the production of a civilian version of the machine began under the designation MP-1 (marine passenger).

In 1935, the MBR-2 was modernized by installing a new M-34N engine, and the defensive armament was also strengthened; the modified aircraft received the designation MBR-2bis. In addition to combat variants, the vehicles were also produced by citizens.

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Russian versions under the designations MP-1 (“marine passenger”) and MP-1bis with a passenger cabin for 6 people. In May 1937, pilot P.D. Osipenko set three height records on MP-1bis with ascent without load and with load. A year later, on the MP-ÿbis, the female crew consisted of: P.D. Osipenko, V.F. Lomako and M.M. Raskova — made a record non-stop flight on the Sevastopol-Arkhangelsk route, covering a distance of 2416 km in 10 hours 33 minutes at an average speed of 228 km/h.

By the beginning of the war, the reconnaissance aviation of the Navy was armed with the following number of MBR-2 seaplanes: in the Northern Fleet - 54 copies, in the Baltic Fleet - 151, in the Black Sea Fleet - 140, in the Pacific Fleet - 216. From the very first days of the war, the MBR-2 Baltic , the Northern and Black Sea Fleets carried out reconnaissance, carried out bombardment of enemy combat and transport ships, and also delivered strikes against its ground forces in coastal areas. Usually, MBR-2 tasks were performed in. night time. In total, over 1,300 MBR-2 aircraft of various modifications were built during serial production (1933-1942).

Characteristics of the MBR-2bis: crew - 2 people, power plant - ÿ x M-34 with a capacity of 830 liters. s., wing span - 19.0 m and its area - 55.0 m?, length - 13.5 m, empty weight - 2475 kg, takeoff weight - 4100 kg, maximum speed - 245 km / h, range - 1200 km, rate of climb - 245 m / min, practical ceiling - 7150 m, armament - 2 ShKAS machine guns of 7.62 mm caliber and 500 kg of bombs.

MBR-5

In 1934, under the leadership of P.D. Samsonov, a project of the MBR-5 amphibious aircraft was developed. Compared to the MBR-2, the new aircraft had more advanced aerodynamic shapes and a chassis that retracted into the hull of the boat.

The first flight of the experimental machine took place on October 3, 1935, the tests continued until the end of the year, after which the aircraft was finalized. During the flight on October 2, 1937 from Taganrog to Sevastopol for state tests, the plane sank during takeoff, but the crew was not injured. The aircraft was raised and restored, but the Navy refused further tests. |

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Characteristics of the MBR-5: crew - 4 people, power plant - | X M-25V with a capacity of 775 liters. s., wingspan - 15.5 m and its area - 32.5 m2, length - 11.2 m, height - 4.86 m, empty weight - 2060 kg, take-off weight - 3260 kg, maximum speed - 277 km/h, range - 1400 km, practical ceiling - 7400 m, armament - 2 DA-2 machine guns of 7.62 mm caliber and 500 kg of bombs.

MBR-7

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In 1938, OKB G.M. Beriev began to develop the MBR-7 (MS-8) flying boat, which would surpass the MBR-2 flying boat in terms of its flight performance. On tests, the prototype aircraft showed good flight data, but it was not recommended for production. The main reason was that OKB G.M. Berieva at that time was loaded with work on the introduction of a licensed aircraft RVY I, and was also engaged in fine-tuning and refinement of KOR-| and MBR-2. MBR-7 remained in a single copy.

Characteristics of the MBR-7: power plant - ÿ x M-103 with a capacity of 960 liters. s., wing span - 13.0 m and its area 26.0 mg, length - 10.6 m, empty weight - 2418 kg, takeoff weight - 3600 kg, maximum speed - 376 km / h, range - 1215 km , practical ceiling - 8500 m, armament - 2 ShKAS machine guns of 7.62 mm caliber and 500 kg of bombs.

MDR-2 (ANT-8)

In 1930, at TsAGI under the leadership of A.N. Tupolev, the ANT-8 seaplane was developed. A.N. Tupolev, who worked at TsAGI from 1918 to 1936, was appointed in 1936 the first deputy head and chief engineer of the GUAP Narkomtyazhprom, while simultaneously working as the chief designer of the design bureau, which had spun off from TsAGI. He was unreasonably repressed and in 1937-1941, while in prison, he worked in the TsKB-29 NKVD.

Completed in December 1930, the ANT-8 seaplane was equipped with two engines that drove pusher propellers. A prototype aircraft under the designation MDR-2 (sea long-range reconnaissance aircraft) took off for the first time on January 30

rya 1931 State tests were held from February 15 to March 20 in Sevastopol. At the same time, a civilian version of a flying boat for the North was being developed, but work on the MDR-2 was not continued further.

Characteristics of MDR-2 (ANT-8): crew - 5 people, power plant - 2 x VMUU-UI with a capacity of 680 hp each. s., wing span - 23.7 m and its area - 84.0 mg, length - 17.0 m, empty weight - 4560 kg, takeoff weight - 6665 kg, maximum speed - 202 km/h, range - - 695 km, practical ceiling - 3580 m, armament - 2 DA machine guns of 7.62 mm caliber and 900 kg of bombs.

MDR-4/MTB-1 (ANT-27)

In the spring of 1930, under the leadership of Igor Vacheslavovich Chetverikov, who began his career in 1928 at OKBD.P. Grigorovich and who later became the author of many projects of naval aircraft, began to develop the MDR-3 marine long-range reconnaissance aircraft equipped with four VMY Mÿ engines, placed in tandem in two installations above the wing. The prototype of the aircraft was ready in December 1931, and on January 15, 1932, the car took to the air for the first time. The crew of the MDR-3 consisted of 7 people, the armament consisted of four installations with coaxial machine guns and two 250-kg bombs on an external sling. During the tests, it turned out that the aircraft, along with such positive characteristics as long range and long flight duration, has low speed, low rate of climb and a small service ceiling. Therefore, a decision was made to continue working on the MDR-3 aircraft, since February 1933 the brigade of I.I. Pogossky in KBA.N. Tupolev.

The refinement actually turned into the creation of a new aircraft MDR-4 (ANT-27), only the hull was retained from the predecessor. The wing was redesigned, a stabilizer with a single keel was installed instead of a two-beam tail section, the aircraft was equipped with three M-34RN engines. Two external engines drove the pulling screws, the central engine - the pushing screw. The machine was developed in three versions: a long-range reconnaissance aircraft (a crew of 5 people), a heavy bomber (a crew of 7 people) and a passenger aircraft with 14 seats. The prototype MDR-4 was built towards the end

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1933, then the car was sent to Taganrog. The first flight took place in March 1934, but during one of the test flights on April 15, the aircraft crashed during takeoff. The car, which broke away from the wave, touched the next wave, the struts of the central engine pylon broke from the impact, and the engine fell into the cockpit. All crew members, including the chief designer of the aircraft, I.I. Pogossky, died.

The second prototype, designated ANT-27bis, was built by October 1934, during the winter of 1934/35 it underwent flight tests. During the state tests, the ANT-27bis reached a maximum speed of 232 km/h and a practical ceiling of 5000 m. In September 1935, during one of the flights, the ANT-27bis crashed.

Nevertheless, it was decided to start mass production of machines under the designation MTB-I (sea heavy bomber). The development of MTB-I in serial production was difficult - by the end of 1936, five vehicles with M-34R engines were assembled, and in 1937, ten more vehicles with M-34RN engines were assembled. Serial MTB-I vehicles entered service with the aviation of the Black Sea Fleet. Two of them flew as part of the 124th Naval Heavy Squadron, based in Sevastopol, and the rest were mothballed, since by that time the aircraft was already considered obsolete.

Characteristics of the MDR-4/MTB-1: crew - 7 people, power plant - 3 x M-34R with a capacity of 825 hp each. s., wing span - 39.15 m, its area - 177.5 m?, length - 21.9 m, height - 8.76 m, empty weight - 10,692 kg, takeoff weight - 16,386 kg, maximum speed - 232 km/h, range - 2000 km, rate of climb - 185 m/min, service ceiling - 5000 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 2000 kg of bombs or torpedoes.

MDR-5

The MDR-5 marine long-range reconnaissance aircraft was developed under the leadership of G.M. Beriev. The first prototype, made in the version of a flying boat, was tested from spring to autumn of 1938. The second copy was built in the amphibious version, but during the tests the amphibious landing gear was abandoned and the wheel niches were closed up. Flight results

In general, the tests turned out to be quite good, but the military was not satisfied with the flight range, so the aircraft did not go into production. Both prototypes were transferred in February 1940 to the aviation of the Black Sea Fleet, where they were operated until August 1943, after which one aircraft was transferred to the Baku school of naval navigators, and, in other words, to the Flight Research Institute of the Navy.

Characteristics of the MDR-5: power plant - 2 x M-87A with a capacity of 950 liters each. s., wing span - 25.0 m and its area - 78.5 m?, length - 15.9 m, empty weight - 6083 kg, take-off weight - 8795 kg, maximum speed - 350 km / h, range - 2415 km, practical ceiling - 8700 m.

MDR-6

In 1936, under the leadership of I.V. Chetverikov developed the ARK-3 marine long-range reconnaissance aircraft. Two M-25 engines were located in tandem on a pylon above the wing. In the summer of 1936, the first prototype ARK-3/1 (MP-2 in the civil version) began flight tests, and based on the results of its testing, an experimental batch of five machines with a set of weapons was ordered, these machines were designated ARK-3/2 (MDR-6). Although ARC-3/1 set on April 25, 1937 a height record with a load of 1000 kg - 9190 m, but due to accidents that occurred with ARC-3/1 in 1937 and ARC-3/2 in 1938 ., work on the ARK-3 was stopped.

Nevertheless, work on the MDR-6 continued with the creation of an aircraft with two M-25E engines. An additional wheeled landing gear allowed the aircraft to take off not only from water, but also from

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coastal airfields. The prototype aircraft was successfully tested in 1937, after which it was put into mass production. Serial vehicles, designated Che-2, were equipped with M-63 engines.

In the autumn of 1939, the design of a bomber version of the MDR-6A aircraft with M-105 engines began, which was supposed to have characteristics that were not inferior to the serial DB-3 bomber. To increase the speed, the aerodynamics were improved, the underwing floats were retracted flush into the wing niches.

The first prototype MDR-6A in 1940 passed factory tests, but crashed near Uglich during the flight to the place of state tests. In 1941 built

or a prototype modification of the MDR-6B with enlarged floats, but the war and evacuation prevented the tests. In 1943, two more MDR-6B machines were built, but for 1943 they were already considered obsolete. The last machine was the MDR-6B-5 with two VK-107A engines, built in the summer of 1945.

During the Great Patriotic War, Che-2 aircraft were part of the naval aviation of the Baltic, Black Sea and Pacific fleets. In particular, these flying boats ensured the safety of DB-ZF bombers during raids on Berlin from the island of Saaremaa in 1941.

Characteristics of the ARC-3/2: power plant - 2 x M-25A with a capacity of 650 liters each. s., wing span - 20.1 m and its area - 59.6 m?, length - 14.7 m, empty weight - 3642 kg, takeoff weight - 5600 kg, maximum speed - 260 km / h, range - 3000 km, armament - 3 ShKAS machine guns of 7.62 mm caliber.

Characteristics of the MDR-6 (Che-2): crew - 3-4 people, power plant - 2 x M-63 with a capacity of 1100 liters each. s., wing span - 21.0 m and its area - 59.4 mg, length - 15.73 m, height - 4.3 m, empty weight - 4100 kg, takeoff weight - 6700 kg, maximum speed - 360 km/h, range - 2650 km, rate of climb - 335 m/min, practical ceiling - 9000 m, armament - ÿ 12.7 mm UB machine gun, 1 ShKAS machine gun of 7.62 mm caliber and 1000 kg of bombs.

MDR-7

A flying boat with two M-88 engines was developed in 1938 under the direction of P.D. Samsonov. The first prototype, built in 1940, crashed on its first flight on July 25. The second experimental machine in the spring of 1941 made two flights, after which it was purged in the TsAGI wind tunnel, the purging revealed its poor aerodynamics. The third machine was being finalized, but not tested.

Characteristics of the MDR-7: crew - 3-4 people, power plant - 2 x M-89 with a capacity of 1100 liters each. s., wing span - 17.0 m and its area - 36.0 m", length - 14.6 m, empty weight - 4100 kg, takeoff weight - 6300 kg, maximum speed - 494 km/h, range - 3500 km, practical ceiling - 9000 m, armament - 2 BS machine guns of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber and 1000 kg of bombs.

MDR-10/RTB

In 1942, in accordance with the terms of reference for the creation of a marine long-range reconnaissance design bureau G.M. Berieva, who was evacuated in Omsk, developed the project of the MDR-10 aircraft in several versions - amphibious, anti-submarine, photographic reconnaissance and landing. It was a two-keel flying boat with a gull-wing;

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two M-71 engines. Armament consisted of one 23 mm cannon, four 7.62 mm machine guns and two 12.7 mm machine guns. The aircraft could take up to 3000 kg of bombs on an external sling.

An alternative seaplane design under the designation RTB was developed under the leadership of Bolypenko at the Mo 288 plant. The aircraft was equipped with two M-90 engines, it could carry up to 2500 kg of bombs or two torpedoes, and had four 12.7 mm machine guns as a defensive weapon.

Both projects failed.

Characteristics of the MDR-10: crew - 6 people, power plant - 2 x M-71 with a capacity of 1700 liters. s., wing span - 33.0 m and its area - 120.0 m?, length - 23.0 m, takeoff weight - 22,100 kg, maximum speed - 400 km / h, range - 5600 km, service ceiling - 8100 m, armament - | 23 mm VYa cannon, 2 12.7 mm ULT machine guns, 4 7.62 mm ShKAS machine guns and 3,000 kg of bombs.

Characteristics of the RTB: power plant - 2 x M-90 with a power of 1650 liters. s., wing span - 22.0 m and its area - 64.0 m?, length - 17.2 m, takeoff weight - 9000 kg, maximum speed - 510 km/h, range - 4000 km, practical ceiling - 11,500 m, armament - 4 BL-12 machine guns of 12.7 mm caliber, 2500 kg of bombs or 2 45-36AB-A torpedoes.

MI-3 (ANT-21)

In January 1932 in KBA.N. Tupolev team A.A. Arkhangelsk began to develop a twin-engine high-speed fighter (“cruiser” in the terminology of that time). Compared to the R-6 predecessor, this aircraft, which received the military designation MI-3 (multi-seat fighter), and according to the design bureau numbering - ANT-21, with the same two M-17 engines, had a completely different appearance. Its fuselage was smooth, oval in section; cabins partially or completely closed, retractable landing gear. engine hoods

were used as fairings for retractable landing gear wheels. The wing originally had a corrugated skin, as in the R-6 and other aircraft of A.N. Tupolev, the vertical tail was made spaced. The crew of the aircraft consisted of three people, as armament the aircraft carried two small installations of twin 7.62 mm machine guns, one in the nose and one in the dorsal turret at the rear of the fuselage. The first flight of the prototype took place on May 23, 1933. During further tests, a speed of 350 km / h was reached. Attempts to increase it to 400 km/h led to flutter and problems with aircraft controllability in flight. On September 14, 1933, an accident occurred. The rudders broke at the same time, but the test pilot managed to land the plane, landing gear was damaged. After the accident, they began to build an alternate aircraft, but with a modified design. The spaced vertical plumage was replaced with a conventional one on a high keel, which was integral with the fuselage and had a smooth skin, but the skin on the wing still remained corrugated. A number of changes were made in the plumage, the shape of the lower fuselage was changed, the forward cockpit was closed and the shape of the rear cockpit was changed. The second aircraft received the designation MI-ZD (ANT-21bis). This time the factory tests went much better; aircraft control was better. But for the Air Force MI-ZD in 1934 was no longer of interest, so the program was canceled. Characteristics of MI-3 (ANT-21): crew - 3 people, power plant - 2 x M-17 with a capacity of 680 liters each. s., wing span - 19.11 m, its area - 52.1 m ?, length - 10.85 m, empty weight - 3412 kg, take-off weight - 5955 kg, maximum speed - 351 km / h, service ceiling - - 7885 M. Characteristics of MI-ZD (ANT-21bis): crew - 3 people, power plant - 2 x M-34N with a capacity of 750 liters each. s., wing span - 20.76 m and its area - 59.2 m ”, length - 11.57 m, empty weight - 4058 kg, take-off weight - 5608 kg, maximum speed - 350 km / h, practical ceiling - 8300 m

MiG-1 (I-200)

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In 1939, under the leadership of Artem Ivanovich Mikoyan, who worked in 1938-1939. at N.N. Polikarpov, and in 1940, who became the chief designer of plant No. 1, and Mikhail Iosi

Fovich Gurevich, deputy chief designer since 1940, began the development of an interceptor fighter, which was to be equipped with an AM-35A or AM-37 engine.

In parallel with the I-200, a project was developed for the PBSh-1 armored attack aircraft with the AM-38 engine. The aircraft was a monoplane armed with two MP-6 wing cannons of 23 mm caliber and six ShKAS wing machine guns. After the PBSh-1 project was not approved, the Design Bureau developed a project for the PBSh-2 attack aircraft with an AM-38 engine and armament from two MP-6 cannons and six ShKAS machine guns. PBSh-2 was a biplane, the upper wing of which had a large negative sweep and was shifted back in relation to the upper wing. However, this project was not accepted either, and the Design Bureau was recommended to focus on the development of the I-200 fighter.

After the design of the I-200 was completed, three prototypes of the machine were built, the first of which took off on April 5, 1940. The aircraft was equipped with an AM-35A high-altitude engine, carried three machine guns and 200 kg of bombs as weapons.

After flight tests were carried out, during which the fighter developed a maximum speed of 628 km/h, serial production of the aircraft began under the designation MiGG-1. At the end of 1940, the prototype I-200 No. 37) of an aircraft with an AM-37 engine, the first flight took place on January 6, 1941, but it was not possible to complete the tests and refinement of the AM-37 engine on I-200 No. 02, since on May 7, 1941 the aircraft crashed due to for engine failure. The aircraft was wrecked and never recovered.

Serial MiG-1 fighters began to enter combat units in April 1941, immediately after the start of the war, two special-purpose fighter regiments were formed on the basis of the MiG-1, staffed mainly by test pilots. However, in the course of combat use, insufficient stability of the aircraft in flight, a short flight range and low survivability of the structure were revealed, as a result of which the production of machines was limited to 100 copies.

Characteristics of the MiG-1: crew - 1 person, power plant - | x AM-37 with a capacity of 1400 liters. s., wing span - 10.2 m, its area - 17.44 m?, length - 8.15 m, height - 3.3 m, empty weight - 2398 kg, takeoff weight - 3298 kg, maxi

low speed — 660 km/h, range — 580 km, rate of climb — 1,008 m/min, service ceiling — 12,000 m, armament — 1 BS machine gun of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber , 8 NURS ROS-822 or 220 kg of bombs.

MiG-3

As a result of further work on the MiG-1, a new modification of the fighter with the AM-35A engine appeared, which received the designation MiG-3. This modification had improved aerodynamics, increased fuel capacity, more powerful weapons and armor.

In the summer of 1941, a variant of the fighter with the AM-38 engine appeared; on July 31, it took off for the first time. The replacement of the engine was due to the fact that the entire stock of AM-35A engines was used to equip Il-2 attack aircraft. During the tests, the aircraft showed significantly better flight characteristics at altitudes up to 4000 m, although the maximum speed was only 592 km/h. |

In April 1942, the last 75 fully equipped vehicles were handed over to the Moscow Air Defense. The situation with the restoration of MiG-3 aircraft damaged in battles is such that in

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Due to the lack of AM-35A engines, combatant units independently installed AM-38 engines. So, for example, in the 402nd Fighter Aviation Regiment in November 1941, in the field, AM-38 engines were installed on two aircraft. During one of the test flights, the regiment commander, Major K.A. Gruzdev on the MiG-3 fighter from the mouth

with the AM-38 engine upgraded on it, he shot down two German bombers.

MiG-3 was used until 1943 on all fronts and naval aviation. Our ace, A.I. Pokryshkin, flying a MiG-3, shot down ten enemy aircraft, including five VT 109Es. In total, during the war years, 3422 MiG-3s of various modifications were built.

Characteristics of the MiG-3: crew - | man, power plant - 1 x AM-35A with a capacity of 1350 liters. s., wing span - 10.2 myogo area - 17.44 m ?, length - 8.25 m, height - 3.5 m, empty weight - 2595 kg, takeoff weight - 3355 kg, maximum speed - 640 km / h, range - 857 km, rate of climb - 943 m / min, practical ceiling - 11,500 m, armament - 1 UBS machine gun of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber, 6 NURS RS- 82 and 200 kg bombs.

MiG-5 (DIS-200)

In 1940, under the leadership of A.I. Mikoyan, the development of a long-range escort fighter DIS-200 (MiG-5), which had a spaced tail and a power plant of two AM-37 engines, began. DIS-200 was designed to perform the following main tasks: escorting long-range bombers, breaking through enemy air defenses, conducting patrol service far from their bases, conducting reconnaissance in combat deep behind enemy lines; as well as use as a dive bomber or torpe

informer.

The aircraft was supposed to have powerful armament: one MP-6 23 mm cannon on an easily removable carriage in the forward fuselage, two BS machine guns and four 7.62 mm ShKAS machine guns; up to 1000 kg or one torpedo. It was planned to install two RO-82 jet guns to protect the rear hemisphere.

The first prototype of the DIS-200 (T) fighter took off on June 11, 1941. Under the conditions of the outbreak of war, factory flight tests were carried out until October 5, 1941, after which, during the evacuation of the A.I. Mikoyan, the plane was sent to Kazan. In 1942, work on the DIS-200 fighter with AM-37 engines was stopped.

The second prototype DIS-200 (IT) was equipped with M-82 engines and, like the first vehicle, had reinforced armament, but VYa-23 guns were installed instead of MP-6 guns. The first flight of the machine took place on January 28, 1943. The tests, which lasted until May 12, 1943, showed that the aircraft had good flight characteristics, but the decision on its mass production was not made.

Characteristics of the MiG-5 / DIS-200 (T): crew - 1 person, power plant - 2 x AM-37 with a capacity of 1400 liters each. s., wing span - 15.1 m and its area - 38.9 m", length - 10.87 m, height - 3.4 m, empty weight - 5446 kg, takeoff weight - 7605 kg, maximum speed — 610 km/h, range — 2280 km, rate of climb — 909 m/min, service ceiling — 10,900 m, armament — | MP-6 cannon, 23 mm caliber, 2 BS machine guns, 12.7 mm caliber, and 4 ShKAS machine guns, 7.62 mm caliber.

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Characteristics of the MiG-5/DIS-200 (IT): crew - 1 person, power plant - 2 x M-82F with a capacity of 1700 hp each. s., wing span - 15.1 m and its area - 38.9 m?, length - 11.85 m, height - 3.4 m, empty weight - 6540 kg, takeoff weight - 8060 kg, maximum speed - 604 km / h, range - 2500 km, rate of climb - 794 m/min, service ceiling - 9800 m, armament - 2 VYA-23 cannons of 23 mm caliber and 4 BK machine guns of 12.7 mm caliber.

MiG-9

The MiG-9 aircraft was a modification of the MiG-3 fighter with the M-82 engine, the development of which was developed by OKB A.I. Mikoyan was ordered to be completed by July 1, 1941. The armament of the vehicle was to consist of three UBS machine guns and two ShKAS machine guns.

The first prototype of the MiG-9 was built in the summer of 1941, the first flight of the machine took place on July 23, 1941, and on August 25, the second experimental machine began testing. During the tests, it turned out that the actual maximum speed of the aircraft was lower than the calculated speed, which required the completion of the engine cowl, fuselage and some other parts of the aircraft. In October 1941, OKB A.I. Mikoyan was evacuated to Kuibyshev, where in January 1942 aircraft testing resumed. In the spring of 1942, three more cars were built.

After returning to Moscow from evacuation, all five aircraft were finalized. At the beginning of June 1942, three MiG-9s were handed over for military trials to the 34th Air Defense Fighter Aviation Regiment, and one more to the 12th Guards Air Defense Fighter Aviation Regiment. At the end of October 1942, three aircraft from the 34th Air Regiment were returned for revision due to frequent problems with the engine. After new modifications, three MiG-9s fought as part of the 260th Air Division of the Karelian Front until they were decommissioned due to wear and tear in 1944. not mass-produced.

Characteristics of the MiG-9: crew - ÿ person, power plant - | x M-82A with a capacity of 1600 liters. s., wing span - 10.2 m and its area - 17.44 mg, length - 8.08 m, empty weight - 2762 kg, takeoff weight - 3382 kg, maximum speed - 565 km / h, range - 1070 km, rate of climb - 746 m/min, service ceiling - 8700 m, armament - | 12.7 mm UBS machine gun, 2 7.62 mm ShKAS machine guns, 6 NURS RS-82 and 200 kg of bombs.

MiG-11 (I-220)

The design of the I-220 high-altitude fighter with the AM-37 engine began at the Design Bureau of A.I. Mikoyan in July 1941. It was supposed to carry two ShVAK cannons and two UBS machine guns as armament, in this composition the aircraft was recommended for inclusion in the plan for the pilot aircraft construction for 1942. However, later work on the AM-37 engine was stopped, therefore it was planned to install the AM-39 engine on the new version of the machine.

The first prototype of the MiG-11 (I-220) fighter, equipped with a low-altitude AM-38F engine (due to the lack of an AM-39 engine suitable for flight), was built in September 1942, and on November 20 flight tests. The aircraft, armed with two ShVAK cannons, had high speed and rate of climb, the maximum speed was 624 km/h at an altitude of 2650 m. The aircraft climbed 3000 m in 2.5 minutes, and 5000 m in 4.6 minutes. At an altitude of up to 4000-5000 m, the I-220 fighter at the beginning of 1943 could compete with any German aircraft.

The first flight of the aircraft with the originally planned AM-39 engine took place on May 25, 1943. During the tests, the aircraft reached a maximum speed of 697 km/h at an altitude of 7800 m, the aircraft climbed 5000 m in 4.5 minutes, and 8000 m - in 8.2 minutes. However, the engine had many design flaws that interfered with the normal operation of the aircraft. Therefore, in September 1943, the serial AM-38F engine was again installed on the aircraft. With this

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engine, the car passed state tests from October 22, 1943 to January 2, 1944, reaching a maximum speed of 652 km/h during testing. Based on the test results, it was recommended to speed up the development of the AM-39 engine and present the I-220 with AM-39 to state tests.

The machine with the upgraded AM-39 engine, having passed additional factory tests, entered the state tests in September 1944. On them, the aircraft showed the following characteristics: maximum speed - 668 km / h at an altitude of 6800 m, climb time of 5000 m - 6.3 minutes, practical ceiling. — 11,000 m. However, given that the serial Yak-3, Yak-9U and La-7 fighters had similar or even higher performance, on September 26, at the request of the chief designer A.I. Mikoyan was withdrawn from testing, and further work on it was discontinued.

Characteristics of the MiG-11: crew - | man, power plant - 1 x AM-39 with a capacity of 1800 liters. s., wing span - 11.0 m and its area - 20.38 m:, length - 9.5 m, height - 3.66 m, empty weight - 3103 kg, takeoff weight - 3835 kg, maximum speed - 697 km / h, range - 660 km, rate of climb - 1111 m / min, service ceiling - 11,000 m, armament - two ShVAK cannons of 20 mm caliber and two UBS machine guns of 12.7 mm caliber.

MiG/I-221

In accordance with the order of the People's Commissariat of the Aviation Industry dated June 14, 1943, the team of the Design Bureau A.I. Mikoyan was instructed to build a fighter-interceptor with a combat altitude of 14,000 m by September 1. To speed up the work, the MiG-11 (I-220) fighter was adopted as a prototype.

By mid-autumn 1943, the I-221 fighter, equipped with an AM-39A engine, was built and handed over to flight aircraft.

torture. The first flight took place on December 2, 1943. During one of the test flights on February 7, 1944, the test pilot reported that the car caught fire at an altitude of 9000 m, after which he was forced to leave the car with a parachute. Subsequently, a commission set up to investigate the accident found that it was caused by an incorrect assessment of the situation by the pilot, who mistook the appearance of long torches of flame emanating from the exhaust pipes of the engine turbochargers and smoke in the cockpit as a fire. crashed the car was beyond repair.

Characteristics of the MiG/I-221: crew — 1 person, power plant — | x AM-39A with a capacity of 1550 liters. s., wing span - 13.0 m and its area - 22.44 m ”, length - 9.55 m, height - 3.7 m, empty weight - 3296 kg, take-off weight - 3800 kg, maximum speed - 690 km / h, range - 1000 km, rate of climb - 1087 m / min, service ceiling - 11,000 m, armament - 2 ShVAK guns of 20 mm caliber.

MiG/I-222

A new version of the high-altitude fighter OKB A.I. Mikoyan differed from the predecessor I-221 mainly in the presence of a pressurized cabin. The machine, which received the designation I-222, was built by April 23, 1944. It was equipped with an AM-39B engine, armament consisted of two 20-mm SSH-20 guns. |

The first flight of the machine took place on May 7, 1944. During the tests, due to the unstable operation of the engine, it was not possible to achieve the calculated value of the practical ceiling, it was only 12,000 m instead of the calculated value of 14,500 m. All attempts to modify the engine were unsuccessful, therefore For this reason, in the summer of 1945, all work on the I-222 was stopped.

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Characteristics of the MiG / I-222: crew - | man, power plant -- | x AM-39B with a capacity of 1900 liters. s., wingspan - 13.0 m and its area - 22.44 m2, length - 9.6 m, height - 3.26 m, empty weight - 3076 kg, take-off weight - 3790 kg, maximum speed - 691 km/h, range - 1000 km, rate of climb - 909 m/min, service ceiling - 14,500 m, armament - 2 SSH-20 guns of 20 mm caliber.

MiG/I-224

The “stratospheric fighter”, equipped with a pressurized cockpit and boosted AM-39FB engine, received the designation I-224. The armament of the I-224 consisted of one 20-mm B-20 cannon (the second B-20 cannon was installed only in overload). The first flight of the I-224 took place on September 16, 1944, and two weeks later, on its fifth flight, the aircraft crashed during an emergency landing due to engine failure. Since there was no other engine, we had to wait for the repair of the failed engine to be completed.

At the end of 1944, the I-224 fighter was sent to the LII to continue testing, and in February 1945 the engine had to be replaced again. The tests continued after the end of the war, and ended on October 26, 1945. The pressurized cabin was fully worked out on the aircraft and the practical ceiling of 14,100 m was reached. However, problems with the engine remained, so in 1946 work on fighter were discontinued.

Characteristics of the MiG / I-224: crew - 1 person, power plant - 1 x AM-39FB with a capacity of 1800 liters. s., wing span - 13.0 m and its area - 22.44 m?, length - 9.6 m, height - 3.66 m, empty weight - 3105 kg, take-off weight - 3780 kg, max. low speed - 693 km/h, range - 1400 km, rate of climb - 1250 m/min, service ceiling - 14,100 m, armament - 2 B-20 guns of 20 mm caliber.

MiG/I-225

In the spring of 1944, in the design bureau of A.I. Mikoyan modified the I-220 aircraft (manufacturer Ho 02). The modified machine received the designation I-225, it was equipped with an AM-42FB engine. The prototype fighter took off for the first time on July 21, 1944, in further tests it reached a maximum speed of 721 km/h at an altitude of 8850 m, and gained an altitude of 8000 m in 7.9 minutes. During the next test flight on August 9, 1944, the engine caught fire, and the pilot was forced to leave the car with: a parachute, the plane was lost.

The second copy of the I-225 fighter took off for the first time on March 14, 1945. Initially, it was planned to install the AM-43 engine on the aircraft, but due to its absence, the AM-42FB was installed. The armament of the I-225 consisted of four 20-mm cannon

Shek SSH-20. During the sixteenth flight, April 26, 1945, the aircraft crashed during takeoff. After repairs, the fighter continued testing in June 1945. During the tests, a maximum speed of 726 km / h was reached at an altitude of 10,000 m, which the I-225 gained in just 8.8 minutes. The ascent to a height of 5000 m was a record low - only 4 minutes. In the course of further tests of the aircraft, the engine changed several times, therefore, in accordance with the decree of the USSR Council of Ministers of March 11, 1947, work on the I-225 was stopped.

Characteristics of the MiG/I-225: crew -- | man, power plant - G x AM-42FB with a capacity of 1900 liters. s., wing span - 11.0 m and its area - 20.4 m?, length - 9.5 M, height - 3.7 m, empty weight - 3010 kg, take-off weight - 3912 kg, maximum speed — 726 km/h, range — 1,300 km, rate of climb — 1,250 m/min, service ceiling — 12,600 m, armament — 4 SSH-20 guns of 20 mm caliber.

MiG/I-231

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In October 1943, an experimental model of the I-231 fighter with an AM-39A engine and armament consisting of two 20-mm ShVAK guns was handed over for factory testing. The first flight of the machine took place on October 19, but on November 5, due to the destruction of the engine supercharger, the pilot had to perform an emergency landing. Flights resumed on November 23 after repair and installation of a new engine. During the tests of the I-231 fighter, a maximum flight speed of 707 km / h was achieved at an altitude of 7100 m.

On February 26, 1944, the car was sent to the Air Force Research Institute for state tests. The tests did not last long, as on March 8 the plane crashed. During landing, the flaps did not extend and the brakes failed, due to which, at the end of the run, the aircraft rolled out of the runway and decoupled. The aircraft was returned to the Design Bureau for refurbishment, after which on May 12 it was again not delivered to the Air Force Research Institute. But on May 19, during the next flight, the engine failed. The receipt of the new AM-39 engine was delayed, and soon the work on the aircraft was stopped.

Characteristics of the MiG / I-231: crew - | man, power plant — | x AM-39A with a capacity of 1800 liters. s., wingspan - 10.2 m; its area - 17.44 m?, length - 8.62 m, height

ta - 3.275 m, empty weight - 2583 kg, takeoff weight - 3287 kg, maximum speed - 707 km / h, range - 579 km, rate of climb - 1097 m / min, service ceiling - 11,400 m, armament - 2 ShVAK guns of 20 mm caliber.

MTB-2 (ANT-44)

Developing a line of seaplanes, in the Design Bureau A.N. Tupolev in March 1937 built a prototype naval heavy bomber MTB-2 (ANT-44). A machine equipped with a retractable landing gear and Gnome-Ron engines with a power of 810 hp each. s., first took off from the airfield on April 19. In the course of further tests, several records were set on it for carrying capacity and flight speed with a load among amphibious aircraft.

The second prototype, equipped with more powerful M-87A engines, began testing in July 1938, by September both machines were already in service with the Navy aviation. In February of the following year, after an unsuccessful landing on the water, the second plane sank. Based on the results of the operation of the aircraft, it was decided not to launch the MTB-2 in a series.

During the Great Patriotic War, the first experimental machine was in service with the aviation of the Black Sea Fleet, performing, depending on the task, the functions of a bomber, transport or communications aircraft. On her account - the implementation of night raids with the bombing of oil refineries in Romania, which supplied the German troops with fuel. In early 1943, the plane crashed while landing on water and sank.

Characteristics of the MTB-2: power plant - 4 x M-87A with a capacity of 950 liters each. s., wing span - 36.5 m and its area - 146.7 m?, length - 25.4 m, empty weight - 12,000 kg, takeoff weight - 21,500 kg, maximum speed - 355 km/h , range - 4550 km, practical ceiling - 7500 m.

MU-4/MU-5

In August 1937 in Leningrad under the leadership of N.G. Michelson, the MU-4 training flying amphibious boat was completed. The first prototype crashed during factory testing. The second prototype in May 1938

successfully passed flight tests at the hydrobase of the Naval Aviation Research Institute in Sevastopol. In winter, the car was operated on a ski chassis. Based on the results of trial operation, it was planned to build an experimental batch of 30 MU-4 vehicles.

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In parallel with the tests of the MU-4, the development of the MU-5 flying boat with a more powerful MV-6 engine was going on. The armament of the boat consisted of one machine gun and 100 kg of bombs. After presenting the MU-5 prototype to the commission on November 15, 1938, it was recommended to build a prototype. However, at that time the chief designer N.G. Mikhelson and some of his employees were repressed, and all work on the MU-4 and MU-5 ceased.

Characteristics of the MU-4: crew - 2 people, power plant - ÿ x MG-11F with a capacity of 190 hp. s., upper wing span - 12.0 m, lower wing - 9.0 m and wing area - 33.0 m2, length - 8.7 m, height - 3.7 m, empty weight - 989 kg, takeoff weight - 1256 kg, maximum speed - 173 km / h, practical ceiling - 3400 m.

NB

At the end of 1941, under the leadership of N.N. Polikarpov, the development of the NB bomber (night bomber) began, which was supposed to replace the DB-3 bombers. The aircraft was equipped with two engines, had a spaced vertical tail and a large fuselage bomb bay, in which a bomb weighing 5000 kg could be hung. The work was carried out in evacuation, in Novosibirsk, so the design of the aircraft was completed only by September 1942.

The construction of a prototype aircraft was completed in the autumn of 1943, but then it was further developed for a long time. The first flight of the machine with ASh-82FNV engines took place on May 23, 1944, factory tests were carried out in August. In addition to the bombing version, a version of a military transport aircraft with ASh-82 engines and a redesigned fuselage was developed, into which large-sized military equipment could be loaded through a special hatch. However, in connection with the death of N.N. Polikarpov, all work on the NB was stopped, although in many respects the NB was superior to the DB-3 bomber.

Characteristics of the NB: crew - 5 people, power plant - 2 x ASh-82FN with a capacity of 1850 hp each. s., wing span - 21.5 m, its area - 58.1 m?, length - 15.3 m, empty weight - 8843 kg, takeoff weight - 13,800 kg, maximum speed - 510 km / h, range - 3030 km, rate of climb - 417 m / min, practical ceiling - 6150 m, armament - 3 UB machine guns of 12.7 mm caliber and 5000 kg of bombs.

HB-2

In 1935, under the leadership of V.V. Nikitin built a single-seat training aircraft NV-2 with an M-11 engine. It had excellent flying qualities and was used in flying clubs to train instructor pilots.

The modification of the aircraft under the designation NV-2bis (UTI-5) with the MG-31 engine was developed in 1938 by order of the Air Force. The aircraft, armed with one ShKAS machine gun, was intended for training purposes, a total of 20 aircraft were ordered.

Characteristics of NV-2: crew - 1 person, power plant - | x M-11 with a capacity of 100 liters. s., wing span - 8.6 m and its area - 11.0 m °, length - 6, [5 m, height, - 2.14 m, empty weight - 385 kg, takeoff weight - 750 kg, maximum speed — 230 km/h, range — 320 km, practical ceiling — 5800 m.

HB-4

In 1936, under the leadership of V.V. Nikitin developed the NV-4 single-float amphibious biplane with the M-11 engine. During the tests, the aircraft demonstrated good flight characteristics. HB-4 became a prototype during the development of V.V. Nikitin of the project of a military version of the aircraft, which he submitted in 1939 to the competition of shipboard reconnaissance aircraft KOR-2. However, according to the results of the competition, the Be-4 G.M. aircraft went into the series. Beriev.

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Characteristics of NV-4: crew - 2 people, power plant - ÿ x M-11 with a capacity of 100 liters. s., wing span - 10.9 m and its area - 28.5 m", length - 8.7 m, empty weight - 825 kg, takeoff weight - 1090 kg, maximum speed - 160 km/h

OPB-5

The development of the single-seat dive bomber OPB-5 began in 1938 under the leadership of S.A. Kocherigin. The armament of the aircraft consisted of four machine guns and one 500-kg bomb, which was located in the bomb bay, and during the attack of a ground target with the help of a parallelogram mechanism was advanced from the bomb bay. It was planned to start testing a prototype equipped with the M-90 engine in the first half of 1941, but due to the lack of a finished engine, the car had to be converted to the M-89 engine. During testing, problems arose with this engine.

Under the conditions of the outbreak of war, work on the OPB-5 actually stopped, but the aircraft was nevertheless included in the plan for experimental aircraft construction for 1942. In accordance with this plan, the OPB-5 with the M-90 engine should be submitted for state tests to | March 1942. But in the conditions of full employment of the production base with the production of serial aircraft, the OPB-5 dive bomber did not manage to be built in full volume. In the second half of 1942, work on OPB-5 was terminated, the design bureau S.A. Kocherigin was disbanded, and S.A. Kocherigin was appointed chief editor of BNT TsAGI. |

Characteristics of OPB-5: crew — 1 person, power plant — | x M-90 with a capacity of 1725 liters. s., wing span - 10.4 m, length - 8.28 m, empty weight - 2546 kg, takeoff weight - 3842 kg, maximum speed - 600 km/h, range - 660 km, rate of climb - 864 m/min , practical ceiling - 9900 m, armament - 2 BS machine guns of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber and one 500-kg bomb.

Pe-2 (PB-100)

In May 1940, the command of the Red Army Air Force decided to urgently convert the VI-100 high-altitude fighter into a dive bomber. Serial production of the dive bomber under the designation PB-100 began on June 23, 1940, although not even a prototype was built yet. By the end of the same year, the first serial dive bomber, designated Pe-2, was ready; in June 1941, 458 Pe-2 vehicles were in service with the Air Force, and the total

ARCHIVAL MATERIALS, 1943. Three-color camouflage scheme for Pe-2 aircraft

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launch by December amounted to 1626 copies. The Pe-2 immediately became one of the main bomber aircraft, performing, in addition to its main function, the functions of a fighter and reconnaissance aircraft. |

On January 12, 1942, chief designer V.M. died in a plane crash. Petlyakov, therefore, in 1943, V.M. Myasishchev. Throughout the war, the Pe-2 aircraft was continuously improved both in terms of increasing the capacity of the power plant, bomb load and strengthening firepower (Pe-2Sh, Pe-2MV, Pe-2FT, Pe-2F3, Pe-2I , Pe-2D, etc.), and in terms of creating specialized versions of the machine (Pe-2VI high-altitude fighter, Pe-3 fighter-interceptor, Pe-3bis night fighter, Pe-3M fighter, Pe-3 reconnaissance -2R and Pe-ZR, training aircraft Pe-2UT/U). At the end of the war, a version of the Pe-2RD was created, in which the power plant included a liquid-propellant rocket engine RD-I.

Pe-2 aircraft took part in combat operations until the end of the Great Patriotic War and against Japan from August 9 to September 2, 1945; - reading B-32, and the training version - SV-32). The total number of built Pe-2s of all modifications was 11,427 copies.

Characteristics of the Pe-2: crew - 3 people, power plant - 2 x M-105 with a capacity of 1100 hp. With. or 2 x VK-105PF with a capacity of 1260 liters each. s., wingspan - 17.11 m and its area - 40.55 m?, length - 12.78 m, height - 3.42 m, empty weight - 6200 kg, take-off weight - 8520 kg, maximum speed — 580 km/h, range — 1770 km, practical ceiling — 9000 m, armament — 5 ShKAS machine guns of 7.62 mm caliber and 1500 kg of bombs.

Characteristics of the Pe-3M: crew - 2 people, power plant - 2 x VK-105PF with a capacity of 1260 hp each. s., wing span - 17.6 m and its area - 40.5 m?, length - 12.6 m, height - 3.42 m, empty weight - 6005 kg, takeoff weight - 8300 kg, maximum speed - 545 km/h, range - 1200 km, rate of climb - 500 m/min, service ceiling - 9500 m, armament - 2 ShVAK guns of 20 mm caliber, 3 BS machine guns of 12.7 mm caliber and 2 DAG-grenade launchers 10.

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"Pegasus"

In July 1942, under the leadership of D.L. Tomashevich completed the project of a single-seat aircraft for the destruction of tanks and mobile troops of the enemy, the so-called “aircraft

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anti-tank air army. According to the plan of D.L. Tomashevich, the aircraft should be easy to fly and cheap to mass-produce.

The aircraft, equipped with two M-11F engines, was of wooden construction, but with armored vital components. Aircraft fuselage of square section with flat walls. The pilot in a bulletproof vest was placed in an armored box with a wall thickness of up to 13 mm in front, up to 8 mm on the sides, 6 mm in the bottom, and 13 mm in the rear, the armored glass had a thickness of 64 mm. Each of the engines was powered by its own gas tank located behind the engine nacelle. In the event of a fire in the tank, it could be dropped, while the engine was switched to power from a reserve armored tank, which allowed the aircraft to stay in the air for up to half an hour.

The aircraft provided for the installation of a UBK machine gun in the forward fuselage and an easily removable ventral suspension for 500 kg bombs (1 x FAB-500, 2 x FAB-250, 5 x FAB-100 or 5 x FAB-50) or a carriage with two guns VYa.

Four versions of the aircraft were built with different viewing angles from the cockpit. From January 2 to January 14, 1943, the aircraft, which received the designation Pegasus, underwent factory tests, after which it was transferred to state tests. According to the results of state tests conducted from February 28 to April 16, 1943, it was noted that the aircraft was built without TTT, without an official presentation of a preliminary design, without a mock-up, without aerodynamic scavenging of models, without a TsAGI opinion on strength. The conclusion was made about the inexpediency of further work on the aircraft. The tested machine was supposed to be transferred to the range for use as a target, and the fourth machine was to be transferred to one of the reserve aviation regiments for training in cannon shooting.

Characteristics of the Pegasus: crew - 1 person, power plant - 2 x M-11F with a capacity of 150 liters each. s., wingspan - 11.5 m, its area - 26.63 m2, length - 8.76 m, empty weight - 1800 kg, take-off weight - 2150-2700 kg, maximum speed - 172 km / h (with hanging guns VYa) and 167 km / h

(with 500 kg of bombs), range - 400 km, service ceiling - 2620 m, armament - 1 UBK machine gun of 12.7 mm caliber, 2 VYa cannons of 23 mm caliber or 500 kg of bombs.

PS

The problem of reducing the visibility of aircraft began to be dealt with even at the dawn of the development of aviation. One of the ways to reduce visibility was the creation of transparent aircraft. Looking at such an aircraft from any point, the observer will. to see not the plane, but the background behind it. Even in 1912, P. von Petroshi covered the Gaube aircraft of the Lohner company with a transparent material; in 1913, similar work was carried out by A. Knubel in Germany and V.A. Lebedev in Russia. During the First World War, transparent aircraft were built in Germany based on the Fokker E.IP, Rumpler C.1, Albatros B.2 and Linke-Hoffman K.I.

In the Soviet Union, since 1928, the head of the aircraft design department of the Air Force Academy, Sergei Grigorievich Kozlov, worked on the problem of reducing the visibility of aircraft. The problem was divided by him into three separate tasks: the visibility of the skin, the visibility of the internal structure of the aircraft and the visibility of the engine, crew, armament, etc.

Solving the first problem, S.G. Kozlov chose a transparent cellon coating, which had previously been used by the Germans. With further improvement, it was cellon that had the greatest chance of becoming a suitable material for transparent skin.

The second task was to be solved either by creating transparent materials with high strength characteristics, from which it is possible to make structural structural elements, or by using traditional materials, but with a maximum reduction in dimensions.

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power elements. In this case, instead of the specific strength (the ratio of the tensile strength of the material to its density—the larger this ratio, the lower the weight of the structure that provides the specified strength conditions) becomes simply the tensile strength. Based on this, in the first place, according to S.G. Kozlov, instead of duralumin, chromium-molybdenum steel came out.

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To reduce the visibility of the crew, armament, engine and other units, it was supposed to use the so-called "light armor". The essence of the matter lies in the fact that a flying plane against the background of the sky from below looks much darker than the sky itself. Therefore, ideally, one should highlight the lower opaque areas of the aircraft or install a downwardly directed source of scattered light on these surfaces in order to equalize the illumination of the aircraft surface and the background.

At the end of September 1934 S.G. For his experiments, Kozlov received a U-2 aircraft from the Air Force, from which the standard skin was removed, and a cellon was put in its place. In mid-October, flight tests began, which showed a noticeable decrease in the visibility of the fuselage compared to the conventional U-2. At the end of February 1935, the research plan of the VVA included work on the creation of a transparent aircraft. A small design team led by S.G. Kozlova began designing a transparent two-seat aircraft based on the AIR-4 aircraft, which was supposed to be completed in April. The project provided for the use of the “reflective” principle to reduce the visibility of ribs and spars, but this required giving them peculiar constructive forms. Particular attention was paid to the internal structure of the aircraft and the properties of the cellon.

Alterations consisted of the following: the plywood sheathing was replaced with cellon, additional struts and braces were introduced into the load-bearing structure, dual controls were removed, and the main pilot's seat with instruments was moved forward. After the alteration, AIR-4 was named PS ("Transparent Aircraft").

At the same time, the properties of the material for transparent skin were studied. Cellon from the Mytishinsky chemical plant turned out to be the best. This batch, although it still did not fully satisfy all the requirements, was already significantly better than the material that was used on the U-2. Cellon samples were tested in the VVA laboratories, where its mechanical characteristics were determined. Tests have shown the possibility of using cellon not only for covering non-bearing parts of an aircraft, but also for wings and empennage. The transparency and purity of the samples also improved significantly.

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In addition to the transparent sheathing, S.P. Kozlov first proposed to make the surface of the ribs and the walls of the aircraft spars mirror, for this, VVA provided 2 kg of aluminum powder, with the help of which they painted the aircraft frame.

The first flight of the PS took place on July 25, 1935; the post-flight inspection of the aircraft showed that the skin and its fastening passed the strength test. The first results of assessing the visibility of the aircraft were presented in the report of the head of the VVA faculty D.I. Buzanov, who observed flights from the ground, to the chief of staff of the academy: “The visibility of the aircraft after takeoff against the background of clouds at a height of 30–50 m is very much reduced. When the aircraft in the take-off position moves away from the observer, only the central part of the fuselage, landing gear and struts are clearly visible; the rest, although it is caught by the eye, but not in the form of sharp contours, as usual, but in the form of indistinct bands of color somewhat lighter than the background of the clouds. When the aircraft is on the side at a height of 100–150 m, at a distance of 3500–1000 m from the observer, the wing profile, landing gear and horizontal tail profile, engine and crew are clearly visible, at times the vertical tail is hardly noticeable, at times the fuselage disappears completely, at times it is barely noticeable in the form of a very indistinct contour of a slightly yellowish color.

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In early August, Deputy Commissar of Defense M.N. Tukhachevsky ordered the Air Force Research Institute “to test the aircraft and give its opinion on the use of a transparent coating for camouflaging aircraft,” which was done on August 22, 1935. From the act of the commission: “The visibility of the aircraft in most of the angles is reduced very much. At 2000-2500 m, the PS aircraft at some angles was not visible at all either to the members of the commission or to the technicians working at the airfield, despite the fact that its position was known, since the U-2 aircraft, which was paired with it, and R-5 were clearly visible. The impression is that the PS melts before our eyes and then, when it comes to a less favorable angle, it reappears, but it is still quite weakly visible. |

From the air, the visibility of the aircraft was also insignificant: from a distance of 1.5-2 km it could be seen only by random glare from the sun or when turning and flying straight at the observer, when solid plywood spars and ribs overlapped each other and was visible outline of the wing.

The commission's conclusions noted that the use of a transparent coating to reduce the visibility of the aircraft was fully justified, and it was hoped that a specially designed aircraft would give a stronger effect. At the same time, it was recommended to pay attention to improving the transparency and physico-mechanical properties of cellon. In addition, the act noted two more advantages of a transparent aircraft: excellent visibility from the cockpit and the convenience of quickly inspecting the PS aircraft on the ground during pre-flight preparation and post-flight inspection.

Taking into account the positive results, it was planned to expand further work to reduce the visibility of the power structure of the aircraft. For experiments with different variants of load-bearing elements, it was planned to build two airframes with four interchangeable sets of wings and tails. However, due to difficulties in financing the next stage of research, in early November 1935, work on a transparent aircraft was transferred to the Experimental Institute P.I. Grokhovsky. The new work was included in the Institute's plan for 1936, with S.G. Kozlov. However, the transparent aircraft P.I. Grokhovsky never did. built because of the disbandment of his institute.

Some aviation historians are inclined to believe that it was built in the Experimental. Institute, the aircraft G-39 "Cucaracha" could in the future be used to work out the issues of reducing the visibility of the aircraft. Information about the G-39 aircraft is given in the “Tailless” and “Flying Wings” section.

PS-9 (ANT-9)

In October 1927, A.N. Tupolev received the task of designing and building a nine-seat experimental 06-sample airliner for international transportation. The project, which received the designation ANT-9, was headed by I.I. Pogossky. The built prototype, equipped with three Gnome-Ron-Titan engines, was shown on Moscow's Red Square during the May Day parade of 1929. Its first flight took place in mid-May, immediately after which the state tests of the machine began. During the tests, the aircraft flew on June 6-12 from Moscow to

Odessa - Sevastopol - Odessa - Kyiv - Moscow. Following him, from July 10 to August 8, on this aircraft, which received the name “Wings of the Soviets”, an international flight was made with eight passengers on board on the route Moscow - Travemünde - - Berlin - Paris - Rome - Marseille --London--Paris-- Berlin-Warsaw-Moscow with a length of 9037 km. The aircraft covered this distance in 53 flight hours at an average speed of 177 km/h.

Since May 1929, preparations for serial production of the aircraft began. Instead of imported Titans, it was decided to install the domestic M-26 engine with 300 hp. With. However, due to

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constantly detected defects, these engines were soon taken out of production, and the ANT-9 aircraft in 1932-1933. had to be converted for two M-17 engines, these machines received the designation PS-9 (passenger aircraft). Several of them were equipped with ÿÿÿÿÿÿÿ ÿ-4 engines with a capacity of 300 hp. With. In 1933, two aircraft with such engines were handed over to the Soviet-German company Deruluft, which worked on international airlines from 1922 to 1937, after which it was closed. Several ANT-9 aircraft with Mtieg J-4 engines were used in the Air Force as staff aircraft. In addition, a military version with a turret and a retractable turret was developed, but it was not completed.

In 1933, two PS-9 aircraft were included in the propaganda squadron named after Maxim Gorky. The agitation squadron flew from city to city, organizing film demonstrations for the local population, dropped propaganda leaflets in flight, and took on the flight excellent production workers. Each aircraft was given the name of one or another newspaper or magazine published in the USSR. PS-9 were named after the satirical magazine "Crocodile", and V.N. Ushakov and V.B. Shavrov redesigned the forward fuselage under a crocodile head.

PS-9 aircraft have been operated in civil aviation for more than 10 years, mainly in Central Asia and the Caucasus. During the Great Patriotic War, they were widely used for air transportation and as military transport aircraft on various fronts - near Belgorod, Stalingrad, Kursk, in the North Caucasus. In total, about 70 aircraft were produced, mainly with M-17 engines.

Characteristics of the PS-9: crew - 2 people, power plant - 2 x M-17 with a capacity of 680 hp each. s., wingspan - 23.85 mi, its area - 84.0 mg, length - 17.0 m, empty weight - 4400 kg, take-off weight - 6200 kg, maximum speed - 215 km / h, range - 700 km, practical ceiling - 5100 m, passengers - 9.

PS-124 (ANT-206is) |

The ANT-20bis aircraft was a stand-in for the giant aircraft Maxim Gorky (ANT-20) that crashed during a plane crash on May 18, 1935. Immediately after the death of the ANT-20, the Council of People's Commissars of the USSR adopted a resolution on the production of 16 such aircraft, all of them should be nominal - “Vladimir Lenin”, “Joseph Stalin”, “Maxim Gorky”, etc. In the Design Bureau A. N. Tupolev, urgent work began on the production of drawings for the series, which was supposed to be launched at plant No. 124, which was being completed in Kazan.

The main differences between serial machines and Maxim Gorky were in the new power plant and fuselage layout. The appearance of more powerful M-34FRNV engines made it possible to abandon the tandem installation of engines above the fuselage, while the fuselage itself was converted to accommodate 64 passengers. The first production aircraft, which received the designation PS-124 (passenger aircraft of plant No. 124), was ready in the spring of 1939; on May 15, 1939, it took to the air for the first time. Then NS-124 was transferred to Moscow for state tests. After the successful completion of state tests, the aircraft was handed over to Aeroflot, under tail number L-760, until December 1940, it made regular flights on the Moscow-Mineralnye Vody line.

Then the plane was transferred to the special purpose squadron of the Moscow airport. In November 1941, all six M-34FRNV engines were replaced with AM-35 engines, after which the PS-124 was transferred to the Uzbek Directorate of the Civil Air Fleet. It was used to transport people and goods on the routes Tashkent-Chardzhou-Urgench and Tashkent Kuibyshev. During the performance of the next flight on December 14, 1942, PS-124, due to violations of the rules of flight operation by the crew, crashed 90 km from Tashkent, 26 passengers and 10 crew members died. Not a single machine from the ordered PS-124 series was built.

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A military version of the aircraft was also developed with Oerlikon cannons and DA and ShKAS machine guns, the bomb load reached 2000 kg. However, this option was not implemented, since as a heavy bomber and airborne transport aircraft for the Airborne Forces, due to relatively low speeds and flight altitudes, the ANT-20bis became a relatively easy prey for air defense systems and fighter front-line aviation of probable opponents.

Characteristics of the PS-124: crew - 9-10 people, power plant - 6 x AM-34FRNV with a capacity of 1200 liters each. s., wing span - 63.0 m and its area - 486.0 m2, length - 34.1 m, height - 10.85 m, empty weight - 31,200 kg, takeoff weight - 44,000 kg, maximum speed - 275 km / h, range - 2600 km, practical ceiling - 5500 m.

R-5/R-7

In 1928, under the leadership of N.N. Polikarpov was a reconnaissance and light bomber P-5. The aircraft, made according to the biplane scheme, was equipped with an M-17 engine; in the bomber version, it could carry up to 500 kg of bombs on holders under the wing and fuselage of the aircraft.

In 1929, the aircraft successfully passed tests and was recommended for mass production. In 1930, at the international reconnaissance aircraft competition held in Tehran, the P-5 took first place. Serial production of the aircraft ended in 1935, during which time about 5,000 R-5 aircraft in various versions were produced, including a torpedo bomber (R-5T) and an attack aircraft with 10 machine guns (R-5Sh).

In 1932, the G-9 P.I. system was adopted by the Air Force. Grokhovsky, developed for the R-5 aircraft: two Harley-Davidson motorcycles were hung on bomb racks under the wings of the aircraft. Each motorcycle was enclosed in a special frame and equipped with two parachutes, which were connected through a hole in the center of the first dome and opened one by one.

For R-5 P.I. Grokhovsky also developed the G-61 cassettes for transporting troops under the lower wing. Each of the cassettes with celluloid transparent socks had several compartments in which paratroopers were placed lying down. The number of compartments varied depending on the modification

cassette. In addition to the transfer of paratroopers, the cassettes could be used to transport the wounded (special stretchers were designed for this), setting up a parachute rope curtain in the air to fight enemy aircraft, transporting various military and civilian cargo and scattering leaflets. Depending on the specific purpose, the design of the cassettes could change, and Grokhovsky developed several modifications of the G-61.

One of the first versions of the cassette had only four compartments, each of which was intended for one person or 80 kg of cargo. The design of the cassettes allowed the observer pilot to parachute cargo using a conventional bomb releaser, in the same way paratroopers could leave the car. December 8, 1936 P.I. Grokhovsky himself tested the aircraft in flight with a version of the cassettes, in which there were 14 people. At the same time, the full load of the aircraft, taking into account the pilot and passenger in the second cabin and 250 kg of fuel (incomplete refueling), amounted to 1650 kg.

In late August - early September 1937, two P-5 aircraft (civilian version of R-5) with G-61 cassettes were prepared to participate in the search for the missing DB-A aircraft, which flew from Moscow to America via the North Pole, these aircraft received the designation PG-61. There are no details about their participation in the search expedition, but it is known that one of the PG-61s was still operated in the beginning of 1941 as part of the polar aviation. |

In 1935, a modernized version of the aircraft called R-2 (R-zet) appeared, equipped with a more powerful AM-34N engine. In 1936-1937. 1100 R-7 machines were produced. On

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in a specially prepared R-2 aircraft, pilot V.V. Shevchenko in May 1937 reached a record height for aircraft of this class - 11,100 m.

R-7 aircraft showed themselves well in air battles in Spain, where they were delivered in the amount of 62 copies, as well as in battles with the Japanese in the Far East in 1939. In the first period of the Great Patriotic War, they were in service with light bomber regiments , as well as before being replaced by Il-2 attack aircraft, were used for direct support of troops.

Characteristics of the R-5: crew - 2 people, power plant - 1 x M-17 with a capacity of 680 liters. s., span of the upper roof

la - 15.5 m and wing area - 50.5 m ”, length - 10.56 m, height - 3.75 m, empty weight - 2197 kg, take-off weight - 3247 kg, maximum speed - 228 km/h, range - 800 km, rate of climb - 295 m/min, service ceiling - 6400 m, armament - | PV-1 machine gun of 7.62 mm caliber, 2 DA machine guns of 7.62 mm caliber and 400 kg of bombs.

Characteristics of the R-2: crew - 2 people, power plant - ÿ x M-34N with a capacity of 850 hp. s., upper wing span - 15.52 m and wing area - 45.52 m?, length - 9.72 m, height - 3.6 m, empty weight - 2230 kg, takeoff weight - 3150 kg, maximum speed - 316 km / h, range - 1000 km, rate of climb - 425 m / min, practical ceiling - 8700 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 400 kg of bombs.

R-6 /MR-6

Multi-purpose reconnaissance aircraft R-6 (ANT-7), developed by VKBA.N. Tupolev, was a reduced copy of the TB-I bomber with the same M-17 engines. The first flight of a prototype, made in the form of a long-range reconnaissance aircraft, took place on September 11, 1929, two years later the first serial machine took off. In addition to the wheeled version of the machine, the float version of the MP-6 (KR-6, “cruiser”) was also built.

At the beginning of 1933, the float aircraft was tested with various variants of mine and torpedo armament, its mass production was launched at the Taganrog Plant No. and partially adapted for civilian purposes. In civil and polar aviation, aircraft were designated MP-6 and were widely used mainly in the North and Siberia until the end of the war.

On the civilian version of the R-6 aircraft with tail number H-166, the crew of the pilot P.G. On May 5, 1937, Golovin made a non-stop reconnaissance flight from Rudolf Island (Franz Josef Land) to the North Pole and back. Throughout the Great Patriotic War, the R-6 aircraft remaining in service were used for the transfer of flight personnel during the relocation of military units, supplies

parts of the Air Force with ammunition, spare parts, fuel, for communication between headquarters and units and for the transport of medicines and the wounded. A total of 400 ANT-7s were built.

Characteristics of the R-6: crew - 4 people, power plant - 2 x M-17F with a capacity of 715 hp each. s., wing span - 23.2 m and its area - 80.0 m ?, length - 14.75 m, height - 4.95 m, empty weight - 3865 kg, take-off weight - 6472 kg, max. maximum speed - 230 km / h, range - 800 km, practical ceiling - 5620 m, armament - 5 DA-2 machine guns of 7.62 mm caliber and 500 kg of bombs.

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Characteristics of the MP-6: crew - 3-4 people, power plant - .2 x M-17 with a capacity of 680 liters each. s., wing span - 23.2 m and its area - 80.0 m?, length - 16.0 m, empty weight - 4640 kg, takeoff weight - 6410 kg, maximum speed - 235 km/h , range - 1700 km, practical ceiling - 5000 m, armament - 2 machine guns DA-2 caliber 7.62 mm or PV-2 caliber 7.62 mm and 500 kg of bombs.

R-10

In 1936, a two-seat reconnaissance monoplane KhAI-5 with an M-25 engine was built at the Kharkov Aviation Institute under the leadership of Iosif Grigorievich Neman. I.G. Neman from 1926 to 1931 worked in the design bureau of K.A. Kalinin, then worked as the chief designer of the KhAI Design Bureau, at the same time heading the Department of Aircraft Design. He was groundlessly repressed and in 1939-1941, being a prisoner, he worked in the TsKB-29 NKVD.

According to the results of state tests, the KhAI-5 aircraft was launched in 1937 into mass production under the designation R-10. A mail-cargo version of the aircraft was also produced under the designation PS-5. The R-10 aircraft was in service with aviation units before the start of the Great Patriotic War.

Characteristics of the R-10: crew - 2 people, power plant - ÿ x M-25 with a capacity of 830 liters. s., wingspan - 12.2 m, length - 9.4 m, height - 3.8 m, maximum speed - 388 km/h, range - 700 km, practical ceiling - 6200 m, armament - 3 ShKAS machine guns of 7.62 mm caliber and 300 kg of bombs.

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RK/RK-I

In 1937, under the leadership of Georgy Ivanovich Bakshaev, an aircraft RK (“Sliding Wing”) was created with a wing area that can be changed in flight. With the help of such a wing, it was supposed to increase the maximum speed in flight and improve the takeoff and landing characteristics of the aircraft. This was achieved by the fact that when landing on each console of the wing in the direction from the fuselage, six movable concentric compartments advanced telescopically, which, when fully extended, almost doubled the total area of the wing. The extension of the compartments occurred in 30-40 seconds, the shift - in 20-30 seconds. The prototype of the RK was tested in 1937 with a positive result, after which (it was decided to develop a high-speed fighter based on it.

The development of the fighter project began in 1938; in the original version, the aircraft was supposed to be equipped with the M-105 engine, but at the end of the year, Design Bureau G.I. Bakshaeva received the terms of reference for the design of a single-seat fighter RK-I with an M-106 engine and a design speed of 800 km/h. Armament was to consist of two cannons and two machine guns. |

In 1940, the aircraft was practically assembled. It differed from its prototype in that it had two wings located one behind the other (in tandem), and additional compartments were pushed onto them during landing. The wing compartments were moved apart and moved with the help of a cable drive from an electric motor, they were completely retracted into the sides of the fuselage. Despite the fact that the aircraft was ready, it was not put up for state tests due to the absence of the M-106 engine. Work on RK-I stopped, soon G.I. Bakshaev was transferred to serial production of the U-2 aircraft, and then the war began.

Characteristics of the Republic of Kazakhstan: crew - | man, power plant— | x M-11 with a capacity of 100 liters. s., wingspan - 132 mi, its area - 16.56 / 28.0 (min. / max.) m ?, length - 7.34 m, take-off weight - 897 kg, maximum speed - 150 km / h , practical ceiling - 2900 m.

Characteristics of RK-I: crew - | man, power plant - 1 x M-106 with a capacity of 1200 liters. s., wing span - 8.2 m and its area - 11.9 / 28.0 (min. / max.) m ?, length - 8.8 m,

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take-off weight - 3100 kg, maximum speed - 780 km / h, armament - 2 ShVAK cannons of 20 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

S/I

In 1936, under the leadership of V.F. Bolkhovitinov began the development of a two-seat high-speed bomber "C", equipped with two M-103 engines. The design feature of this aircraft was the tandem arrangement of engines in the fuselage, which reduced the aerodynamic drag of the machine in flight. The engines, with the help of coaxial shafts, set in motion two counter-rotating propellers installed in the forward fuselage.

In the summer of 1939, factory testing of a prototype began, which was designated as BBS-1 (high-speed short-range bomber) or LB-S (spark light bomber). During the tests, it turned out that its takeoff and landing characteristics need to be improved. After the modification of the wing and the installation of more powerful small arms, the aircraft passed factory tests again, as a result of which the improvement of its take-off and landing characteristics was confirmed. However, during state tests in 1940, the takeoff and landing characteristics of the aircraft were found to be unsatisfactory. For another year, the design bureau worked on correcting this shortcoming by changing the profile of the aircraft wing, but further work on the aircraft was interrupted due to the outbreak of war.

In parallel with the development of the “C” bomber, work was carried out on the creation of the “I” aircraft (a fighter and a dive bomber) of a two-beam scheme, in which a pair of more powerful M-107 engines was to be used as a power plant, which led in rotation are two coaxial pushing screws. In 1941, a model of the aircraft was ready, but the outbreak of war prevented further plans, and the design team of V.F. Bolkho Vitinov was connected to the serial production of the Pe-2 aircraft.

Characteristics "C": crew - 2 people, power plant - 2 x M-103 with a capacity of 960 hp each. s., wingspan -

11.4 m and its area - 22.9 m ?, length - 13.2 m, take-off weight - 5652 kg, maximum speed - 570 km / h, range - 700 km, rate of climb - 360 m / min, practical ceiling - 9000 m, armament - 2 UBT machine guns of 12.7 mm caliber and 400 kg of bombs.

CAM-5

In 1932-1933. under the leadership of Alexander Sergeevich Moskalev, since 1932, the deputy head, and then the head of the Design Bureau of the Voronezh Aviation Plant, a five-seat passenger aircraft SAM-5 with the M-11 engine was built. In 1934, a modification of the aircraft was built under the designation SAM-5bis, which in 1936 participated in several non-stop long-range flights. A series of 37 SAM-5bis aircraft was built in a sanitary version and successfully used in the civil fleet. The next option was the SAM-5-2bis, on which, on September 23-24, 1937, a non-stop flight Moscow-Krasnoyarsk was made, while the distance of 3513 km was covered in 19 hours 59 minutes, which was a world record for light aircraft. In 1938, a prototype SAM-5-2bis was built in a sanitary version for the Air Force. The aircraft successfully passed the tests, a serial batch of 200 aircraft was supposed, but the outbreak of the war prevented this.

Characteristics of CAM-5-2bis: power plant - | x MM-11 with a capacity of 100 liters. s., wing span - 11.49 m, its area - 21.86 m?, length - 8.02 m, empty weight - 710 kg, take-off weight - 1215 kg, maximum speed - 204 km / h, range - 700 km , practical ceiling - 4000 m.

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`CAM-11

The flying boat SAM-11 was developed under the supervision of A.S. Moskalev, the machine was intended both for the training of naval pilots and for local lines of civil aviation. The hull of the boat housed two closed cabins: for two pilots (with dual control) and for two passengers. In the military version, the second cockpit was equipped for an air gunner by installing a coaxial ShKAS machine gun.

In September-October 1940, state tests of the aircraft with the MM-| engine were carried out in Sevastopol, and it was planned to launch the SAM-Pbis with the MV-6 engine into the series. However, it turned out that the MV-6 is very capricious in winter, so all further work on the aircraft was stopped.

Characteristics of CAM-11: crew - 2 people, power plant - | x MM-I with a capacity of 220 liters. s., wing span - 11.5 m; - 4700 m, armament - 2 ShKAS machine guns of 7.62 mm caliber.

CAM-14

In 1939 A.S. Moskalev, commissioned by Aeroflot, developed the SAM-14 aircraft, which was a modification of the SAM-5-2bis aircraft. Aircraft with 140 hp MV-4 engine. With. successfully passed tests at the Research Institute of the Civil Air Fleet from November 1939 to July 1940.

In April 1942 A.S. Moskalev suggested using the SAM-14 as a day or night light attack aircraft. By that time, the aircraft had already passed state tests, was built in two copies and was undergoing trial operation in a special application detachment. As an attack aircraft, the SAM-14 was armed with two ShKAS wing machine guns, one rear ShKAS machine gun, eight RS-132s and four RS-82s. A bomb bay was equipped inside the fuselage, where bombs could be placed: in the first version, four FAB-50s or four FAB-100s, in the second version, 18 AO-15s or 80 AO-2.5s. The cockpit was armored. The maximum design speed was 196 km/h, the flight range was 550 km (in overload 1200 km). However, the aircraft was not accepted into production.

Characteristics of SAM-14: crew - 2 people, power plant - ÿ x MV-4 with a capacity of 140 liters. s., wingspan - 11.49 m and wing area - 21.86 m2, length - 8.06 m, empty weight - 765 kg, take-off weight - 1280 kg, maximum speed - 196 km/h , range - 550 km, practical ceiling - 3360 m, armament - 3 ShKAS machine guns of 7.62 mm caliber, 8 RS-132, 4 RS-82 and up to 400 kg of bombs.

CAM-16

In 1940, under the leadership of A.S. Moskalev, the project of the SAM-16 training seaplane with two MV-6 engines was completed. SAM-16 could also serve as a transport and ambulance aircraft (5 passengers). After the project was finalized (the MV-6 engines were replaced by more powerful MG-31F engines), a decision was made to build a prototype aircraft in 1941. The aircraft, built by 85%, was mothballed with the outbreak of war, and all work on it was stopped.

Characteristics of SAM-16: crew - 2 people, power plant - 2 x MG-31F with a capacity of 350 liters. s., wingspan - 15.5 m and wing area - 32.0 m?, length - 11.9 m, empty weight - 2160 kg, take-off weight - 2400 kg, maximum speed - 336 km / h , range - 1038 km, practical ceiling - 7950 m.

SAM-25

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The SAM-25 aircraft with the M-11F engine was a further modification of the SAM-5-2bis. In 1943, at the training ground of the Airborne Forces, he successfully passed the state tests. This aircraft, which had a long flight range and took off from platforms about 40 m long, was used to communicate with partisan detachments. The command of the Airborne Forces came up with a proposal for the urgent launch of these aircraft in 1944 into mass production.

In production, the SAM-25 was not more expensive than the Po-2 and Yak-6 aircraft, but it surpassed the Yak-6 in flight speed, carrying capacity and flight range (if necessary, it could cover a distance of up to 4000 km without landing). It was especially interesting for its takeoff and landing properties, not inferior in this to the German aircraft E1 156. In the Design Bureau A.S. Moskalev, variants of the SAM-25 aircraft were developed: ambulance, night bomber, attack aircraft, liaison, etc. However, in the conditions of the end of the war, the mass production of this aircraft was not organized.

An attempt by the command of the Airborne Forces to place an order directly through the Design Bureau of A.S. Moskaleva, at least for a small series of machines, caused a negative reaction from the Deputy People's Commissar A.S. Yakovlev (according to the memoirs of A.S. Moskalev).

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Characteristics of SAM-25: crew - 1 person, power plant - 1 x M-11F with a capacity of 140 hp. s., wing span - 11.49 m and its area - 21.86 mg, length - 8.02 m, empty weight - 720 kg, takeoff weight - 1280 kg, maximum speed - 228 km / h, range - 1760 km, practical ceiling - 4850 m.

SB (ANT-40)

In May 1934, the brigade of A.A. Arkhangelsky in A.N. Tupolev began the development of a high-speed bomber SB (ANT-40) with Wright-Cyclone engines. Tests of a prototype aircraft, carried out in the summer of the same year, revealed serious shortcomings. Soon, the second prototype SB-2IS (ANT-40-2) began testing, which differed from its predecessor in size and engines. As a result of the factory tests, which ended by February 6, 1935, both positive features of the new machine (rather high speed, good rate of climb) and negative ones (insufficiently good stability and controllability of the aircraft, as well as problems with engines). The finalization of the aircraft lasted longer

of the year.

The first serial SB bombers with M-100 engines entered the regiments in February 1936, and the combat use of the SB began during the Spanish Civil War, in total, approximately 70 vehicles were delivered to the Republican forces. Spain has become the first testing ground for SB testing in real combat conditions. On October 28, 1936, SB bombers from the newly formed Group 12 (Otirro 12) made their first sortie. Especially successful were the attacks of the Security Council on October 30 and November 1, 1936, when they attacked the base of the Italian air group Amalope de! in the Gamonal area. Texio. As a result of the last attack, 6 S.K.32 fighters were destroyed on the ground, only one managed to take off and escape.

Our bombers outperformed rebel aircraft such as Na! S.K.32 and Neshkke! Not 51, bombers Sargopÿ Ca.101, Zauoia-Magsheshi 5.M.81, LipKetv ÿi 52 and ÿipkegz ÿi 86. On September 2, 1937, the ANT-40 aircraft set a world record - a load weighing 1 ton was lifted to a height of 12,246 m.

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Sat

At the first stage of hostilities in Spain, SB aircraft, controlled first by Soviet and then by Spanish crews, performed their combat missions without fighter cover. They effectively acted against land and sea targets - they delivered strikes against concentrations of enemy troops, its airfields, ports, transport and warships. were often

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cases when SBs intercepted and dispersed enemy bombers in the air. New anti-aircraft guns with more advanced devices for aiming and controlling anti-aircraft fire began to arrive from Germany to combat SB aircraft. The SB began to suffer heavy losses after the German fighter Mezzers iti BE 109B appeared among the Francoists, which had a speed of 425 km / h at an altitude of 3500 m and could intercept SB bombers at altitudes up to 7000 m.

By the beginning of 1938, a batch of SB bombers arrived in China, where the SB fought against the Japanese. With the participation of Soviet bombers, an attack was carried out on one of the largest Japanese air bases located in Taiwan. February 23, 1938 12 SB bombers under the command of F.P. Polynin flew out to attack the air base in the city of Gaibei (Taiwan) and the port of Xinzhou. The targets were successfully hit, all the bombers returned to their aerodrome. Later, a group of twelve SBs under the command of T.T. Khryukina sank the Japanese aircraft carrier Yamato-maru.

From the middle of 1939, 29 SB bombers took part in the fighting at Khalkhin Gol, SB formed the basis of bomber aviation in the Soviet-Finnish war.

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ANT-28

Autogyros at the airport

Barrage balloon

Isan

DVB-102

Airship V-6

I-16 with bombs suspended under the wing of T B-3

Zveno-Aviamatka

Zveno-SPB

I-5 (option)

I-17

I-250

IL-4 in flight

rt" hells

KASKR-1

K-7 (rear view)

e her

La-5

Flying tank Christie

Glider A-7

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Pegasus in flight Pegasus Landing

Falcon purge model (option)

Pegasus ventral harness

Pe-2 in flight

A:

R

Pe-8 in flight

otyny

R-5

Steel-2

Steel-3

Su-5 (I-107)

Takeoff of TB-1 with the help of launch boosters

Start boosters

TB-1 towing nine gliders

Descent of TB-1P into the water

Suspension of armored vehicles under TB-3

I'm fine.

TB-3 on takeoff

Stroy TB-3 (view from the rear gunnery)

TB-3 on skis

yes ita am

Tu-2SDV in flight She-2 on takeoff

UT-2

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ini

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Yak-1

IN AND

The SB became the first Soviet aircraft, the licensed production of which was established abroad. The bomber version with M-100A engines was produced under the designation V-71

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at Aero, Avia and Letov factories in Czechoslovakia. Between 1937 and 1939 101 bomber aircraft and 60 long-range reconnaissance aircraft were built. During the German invasion of Czechoslovakia in 1938, many of the B-71s were captured. Refitted to Luftwaffe standards, they served as training aircraft and were also used to tow targets in aerial gunnery training. Part of the aircraft was then sold by the Germans to Bulgaria.

By the beginning of World War II, the SB bomber, which formed the basis of the Soviet front-line bomber aviation, was obsolete and needed to be replaced. A modification of the aircraft called MMN with M-105 engines entered the state tests in September 1939, after which it was decided to develop a version of a dive-bomber based on MMN. The SB-RK dive bomber differed from the SB by the presence of aerodynamic brake grids under the wing, improved engine nacelle shape, reduced vertical tail height, which allowed it to reach a maximum speed of 480 km/h, it could carry up to 1500 kg of bombs. In December 1940, the SB-RK was renamed Ar-2 (see above).

By June 1941, approximately 94% of the operational bombers of the Soviet Air Force and Navy were SBs. Due to heavy losses in the initial period of the war, SBs began to be used only during night operations. So, for example, in August 1941, SB bombers made 3-4 sorties per night, operating against the 2nd Wehrmacht tank group, which was rushing towards Leningrad. During the defense of Sevastopol, the commander of the aviation of the Black Sea Fleet, Major General N.A. Ostryakov in a night sortie on the Security Council with two FAB-250 bombs seriously damaged and disabled the German battleship Deutschland for a long time. During the Battle of Stalingrad, SB bombers were widely used to attack enemy airfields, concentrations of enemy infantry and armored vehicles.

In addition to the bombing functions, the Security Service performed the functions of reconnaissance, transport and communication aircraft, as well as

as well as glider tugs for the transfer of troops and cargo beyond the front line. During the defense of Moscow, they were used as carriers of searchlights, which illuminated attacking German bombers from above, making them more visible to ground-based air defense systems. A total of 6967 copies of all modifications were produced.

Characteristics of the SB: crew - 3 people, power plant - 2 x M-100 with a capacity of 750 hp each. s., wing span - 20.33 m and its area - 56.7 m", length - 12.57 m, height - 4.7 m, empty weight - 4060 kg, takeoff weight - 5628 kg, maximum speed - 393 km/h, range - 2150 km, practical ceiling - 9000 m, armament - 4 ShKAS machine guns of 7.62 mm caliber and 600 kg of bombs.

SC

In 1938, under the leadership of Matus Ruvimovich Bisnovat, since 1938 the chief designer of the TsAGI Design Bureau, an experimental high-speed SK aircraft with the M-105 engine was developed. A design feature of the aircraft was a retractable cockpit canopy, which fit into the contours of the fuselage in flight. When landing, the canopy went up, providing the pilot with the necessary visibility, the pilot's seat, tracking the movement of the canopy, also went up.

The first prototype SK-1 was built at the beginning of 1939, after a number of modifications it began to be tested in flight a year later. In October of the same year, the second prototype SK-2 began testing, which differed from the prototype in that the cockpit canopy was of the usual type with an emergency drop mechanism, the vertical tail and landing gear were slightly changed, and weapons were installed.

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Despite the good speed characteristics and quite satisfactory take-off and landing characteristics demonstrated during the tests, the SK aircraft remained experimental.

Characteristics of SK-1: crew - 1 person, power plant - | x M-105 with a capacity of 1050 liters. s., wing span - 7.3 m and its area - 9.57 mg, length - 8.0 m, empty weight - 1505 kg, takeoff weight - 2300 kg, maximum speed - 660 km / h, range - 1000 km, practical ceiling - 10 300 m.

Characteristics of SK-2: crew — 1 person, power plant — | x M-105 with a capacity of 1050 liters. s., wing span - 7.3 m and its area - 9.57 m?, length - 8.28 m, height - 2.6 m, empty weight - 1850 kg, takeoff weight - 2300 kg, maximum speed — 660 km/h, range — 620 km, service ceiling — 10,500 m, armament — 2 BS machine guns of 12.7 mm caliber and | machine gun ShKAS caliber 7.62 mm.

"Steel"

Under the general name "Steel", several experimental and serial aircraft were developed, the main structural material in the power elements of which was stainless steel or chromium-molybdenum steel pipes, which was caused by a shortage of aluminum in the country at that time.

The experimental aircraft "Stal-6" in 1930 was developed by Robert Ludwigovich Bartini, an Italian, political emigrant who had been working in our country since 1924. A single-seat aircraft had a feature - a single-wheel landing gear with a wheel retracted in flight. In the autumn of 1933, the aircraft was successfully tested. The speed near the ground was 420 km / h, which at that time was a magnificent achievement. People's Commissar for Heavy Industry G.K. Ordzhonikidze ordered the development of "Stal-6" in the version of the fighter.

At the end of 1933 R.L. Bartini began to develop the aircraft "Stal-7" at the Research Institute of Civil Air Fleet. The aircraft, built by the autumn of 1936, had a reverse gull wing with two M-100 engines in the wing folds. The crew of the aircraft consisted of two people, there were 12 passenger seats in the fuselage compartment, but a bomb bay was provided in its floor in case the aircraft was converted into a bomber.

The tests of the aircraft were successful, it demonstrated excellent flight qualities, and in the spring of 1937 it was decided to put it on a round-the-world flight. However, in 1937 R.L. Bartini was unreasonably repressed, he was imprisoned until 1947, working in the Central Design Bureau No. 29 of the NKVD and the Design Bureau in Gaganrog. Therefore, all further work on the "Steel-7" took place without his participation, while the round-the-world flight of the aircraft did not take place due to the outbreak of war.

The aircraft "Stal-11" was developed in the design bureau of Alexander Ivanovich Putilov, who previously worked in the design bureau of A.N. Tupolev, and

"Steel-8"

1932, who headed the design bureau of the Tushino Aviation Plant. In 1938 A.I. Putilov was unreasonably repressed and, while imprisoned, until 1940 worked in the brigade of V.M. Petlyakov in TsKB-29 NKVD.

"Stal-11" was created both in a civilian version (mail-passenger five-seat aircraft) and in a military one (reconnaissance aircraft), the M-100A engine was used as a power plant. "Stal-11" was built in the autumn of 1936 and was tested on wheels and skis, in

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including in the military version of a high-speed reconnaissance aircraft. The aircraft demonstrated good flight qualities, but was not mass-produced.

Characteristics of "Steel-7": crew - 2 people, power plant - 2 x M-103 with a capacity of 860 liters each. s., wingspan - 23.0 m and its area - 72.0 m?, length - 16.0 m, empty weight - 4800 kg, take-off weight - 11,000 kg, maximum speed - 450 km / h, practical ceiling - 10,000 m.

Characteristics of "Stal-11": crew - 1 person + 4 passengers, power plant - 1 x M-100A with a capacity of 860 liters. s., wing span - 15.0 m, its area - 31.0 m?, length - 12.5 m, empty weight - 1830 kg, takeoff weight - 2700 kg, maximum speed - 430 km / h, practical ceiling - 8000 m.

Su-1/Su-3 (I-135)

By the summer of 1939, under the leadership of P.O. Sukhoi developed a project for a single-seat fighter I-135. It was developed in two versions (the first version with the M-105P engine, the second with the M-106 engine), one cannon, two machine guns and a bomb load of up to 100 kg were provided as weapons.

The first prototype of the I-135 was built by May 25, 1940; it started flight tests in June. On August 3, the plane was damaged during landing, after which it was sent for repairs. During subsequent tests, the engine was destroyed in flight, but the pilot managed to land the car. After replacing the engine, the car continued testing, in December it was given the designation Su-1. However, due to the underdevelopment of the engine, and then the evacuation that began, during which the car was badly damaged, further work on the Su-| have been discontinued.

On the second copy of the I-135, due to the lack of the M-106 engine, the M-105 was installed. This machine, which received the designation Su-3, by the middle of April 1941 was prepared for factory flight tests, which were already carried out in evacuation. During the testing, problems arose again due to the unreliable operation of the M-105 engine, so all further work on the Su-3 aircraft was stopped. The Su-3 was later used in the development of turbo-compressors for high-altitude engines. |

Characteristics of the Su-1: crew - 1 person, power plant - | x M-105P with a capacity of 1100 liters. s., wingspan - 11.6 m and its area - 20.0 m?, length - 8.42 m, height - 2.71 m, empty weight - 2495 kg, take-off weight - 2875 kg, maximum speed - 641 km/h, range — 720 km, rate of climb — 1020 m/min, service ceiling — 12,500 m, armament — | 20 mm ShVAK cannon, 2 ShKAS machine guns 7.62 mm and 100 kg.

Characteristics of the Su-3: crew - | man, power plant — I x M-105P with a capacity of 1100 hp. s., wing span - 10.1 m, its area - 18.0 m2, length - 8.42 m, height - 2.71 m, empty weight - 2496 kg, takeoff weight - 2992 kg, maximum speed - 700 km/h, range — 700 km, rate of climb — 910 m/min, service ceiling — 11,900 m, armament — | 20 mm ShVAK cannon and 2 7.62 mm ShKAS machine guns.

Su-2/Su-4 (BB-1)

In 1936, a competition was announced for the development of a multi-purpose aircraft (short-range bomber, reconnaissance aircraft and attack aircraft). The winner was the ANT-51 aircraft, developed in

KB A.N. Tupolev brigade P.O. Sukhoi. The first prototype ANT-51 (SZ-1 - Stalin's order - the first) took off on August 25, 1937, it was equipped with an M-62 engine with a power of 820 hp.

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With. During further testing, a second prototype crashed due to engine problems.

In November 1937 A.N. Tupolev was arrested and imprisoned. In 1938 P.O. Sukhoi was appointed chief designer of the new Design Bureau, where work on the ANT-51 continued. In the course of further work, the fuselage was redesigned with maximum replacement. aluminum alloys with wood and a new M-87 engine was installed. Two prototypes of the BB-I (short-range bomber), the designation the aircraft received in the Air Force, were ready by the end of 1939. The third prototype, equipped with the M-88 engine, was completed in early 1940, and it became the model for the series. |

In June 1940, the aircraft was put into service, and in the autumn it received the designation Su-2. The first cars were equipped with an M-87A engine with a power of 950 liters. with., on machines of a later release (Su-2U), M-88B engines with a capacity of 1000 liters were installed. s., the last modification of the machine had an even more powerful M-82 engine. The armament of the aircraft consisted of four ShKAS wing machine guns and two machine guns at the rear of the gunner.

However, combat experience showed that short-range bombers operating at low and medium altitudes were too vulnerable to enemy fighters, so the production of the Su-2 was discontinued in April 1942, the total number of aircraft built was 877 copies. . Until the end of the war, the Su-2 was used as a reconnaissance aircraft, a target tug, a training aircraft and a communications aircraft.

With the outbreak of war, a modification of the aircraft was developed under the designation Su-4. It was assumed that the aircraft would be equipped with the M-90 engine, but due to the underdevelopment of the M-90 in April 1942, a car with the M-82 engine had to be put for state tests. The Su-4 was mass-produced and took part in the Great Patriotic War.

Characteristics of the Su-2 (BB-1): crew - 2 people, power plant - 1 x M-82 with a capacity of 1400 hp. s., wingspan - 14.3 m, aircraft length - 10.46 m, height - 3.94 m, empty weight - 3273 kg, takeoff weight - 4700 kg, maximum

speed - 486 km / h, range - 1100 km, rate of climb - 588 m / min, practical ceiling - 9000 m, armament - 6 ShKAS machine guns of 7.62 mm caliber, 500 kg of bombs or 10 RS-82 or 8 RS-132 .

Su-6

The single-seat armored attack aircraft Su-6 was developed in 1940 at the OKB P.O. Sukhoi. The first prototype aircraft with the M-71 engine was built by the end of February 1941, and first flew on March 13. The second prototype armed with six ShKAS machine guns was built by June 10, and the first flight was made on June 16. However, the tests were carried out in evacuation in 1942, but by that time a two-seat attack aircraft with more powerful weapons was already required. A new version of the Su-6 (2A) aircraft with the M-71F engine was put to the test in September 1943.

According to the test results, it was noted that the speed characteristics of the Su-6 are superior to the Il-2 attack aircraft. However, mass production of the M-71F engines failed, so the aircraft was modified for the installation of the AM-42 engine. The Su-6 with the AM-42 engine did not go into serial production, because in terms of its speed characteristics it was slightly inferior to the Il-10 attack aircraft, which had already been put into service. |

Characteristics of the Su-6 (2A): crew - 2 people, power plant - | x M-71F with a capacity of 2200 liters. s., wing span - 13.58 m, its area - 26.0 m2, aircraft length - 9.24 m, empty weight - 4110 kg, takeoff weight - 5534 kg, maximum speed - 514 km / h, range - 972 km, rate of climb - 468 m / min, practical ceiling - 8100 m, armament - 2 guns 11-P-37 caliber 37 mm, 2 machine guns ShKAS caliber

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7.62 mm, 1 UBT machine gun of 12.7 mm caliber, 200 kg of bombs or 6 RS-132.

Su-8

In May 1942, OKB P.O. Sukhoi received the task of building a two-seat long-range armored attack aircraft DDBSh. This aircraft with a spaced tail and two M-71 engines was intended for the implementation

bombing and assault strikes against concentrations of enemy troops, as well as for fire support of their armored forces during an offensive or breakthrough.

Its armament was especially powerful: under the fuselage a battery of two 37 mm cannons and two UBK machine guns of 12.7 mm caliber, four ShKAS machine guns in each wing console, one UBT machine gun in the upper mount and one ShKAS machine gun in the hatch . In addition, he could carry six RS-132s and 400 kg of bombs.

At the beginning of August 1943, the first prototype of the aircraft was transported to Moscow, where more powerful M-71F engines were installed on it. In December 1943, the prototype DDBSh, designated Su-8, began taxiing and approaching, after which the aircraft was finalized. By February 1944, the ventral battery was replaced - it was first equipped with four 37 mm guns, then they were replaced with 45 mm guns. Two prototypes of the Su-8 were tested in 1944, but the aircraft was not mass-produced, because the leadership of the NKAP and the Air Force had the opinion that the war could be won with the available serial Il-2 attack aircraft.

Characteristics of the Su-8: crew - 2 people, power plant - 2 x M-71F with a capacity of 2200 hp each. s., wing span - 20.5 m, its area - 60.0 m ?, aircraft length - 13.5 m, empty weight - 9208 kg, takeoff weight - 13 380 kg, maximum speed - 550 km / h , range - 1450 km, rate of climb - 556 m / min, practical ceiling - 9000 m, armament - 4 cannons of 37 mm (or 45 mm) caliber, 1 UBT machine gun of 12.7 mm caliber, 9 ShKAS machine guns of 7 caliber, 62 mm and 1400 kg bombs.

CX-1

In 1937 Anatoly Georgievich Bedunkovich developed the SH-1 (LIG-10) biplane aircraft equipped with the MG-31F engine. The CX-1 was intended for use in agriculture, as well as as a cargo, passenger and ambulance aircraft. Tests of three experimental aircraft, carried out in 1937-1938, showed that the CX-1 is fully consistent with its multi-purpose designation. As an ambulance aircraft, it was used during the Soviet-Finnish war of 1939-1940. At the beginning of 1941, it was decided

about the serial construction of the SH-1, but it was not implemented due to the outbreak of war.

Characteristics of CX-1: crew - 2 people, power plant - ÿ x MG-IF with a capacity of 330 liters. s., wingspan - 12.8 m, their area - 41.1 m?, length - 10.7 m, empty weight - 1215 kg, take-off weight - 1975 kg, maximum speed - 185 km / h, practical ceiling -- 3800 m, payload -- ÿ medical worker and 3 wounded.

T-1 (ANT-41)

Due to the fact that the flight performance data of the R-6 cruiser quickly became outdated, A.N. Tupolev suggested designing a new light cruiser to escort and protect long-range bombers. Machine, first designated as LK-4 (light cruiser), except

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"cruising" tasks should have been easily converted into a bomber or torpedo bomber.

In March 1934, the brigade of V.M. Myasisheva at TsAGI began the development of an aircraft under the designation ANT-41. In the second half of 1935, when the design and engineering studies of the ANT-41 were being completed, the requirements for the aircraft on the part of the military were changed. Now the main purpose of the vehicle was formulated as a torpedo bomber, the main combat mission of which was to throw torpedoes at enemy battleships and cruisers from low altitudes (from 10 to 40 m) at a speed of 180-200 km/h. Aircraft assignments such as cruiser and bomber came to be considered optional. The aircraft, whose appearance was finally formed by the autumn of 1935, received the designation T-1 (torpedo bomber-first), but it could be used as a bomber or cruiser. The project was carried out in two constructive versions - land and sea (on floats).

The aircraft was equipped with two M-34FRN engines, was armed with three ShKAS machine guns, and could carry two torpedoes or 1,000 kg of bombs. In the reloading version, the bomb load could reach up to 3000 kg. The crew consisted of four people. The forward cockpit housed the navigator-gunner and the pilot. In the middle part of the fuselage were the gunner of the upper installation and the radio operator-gunner of the lower installation.

The first flight of an experimental machine took place on June 2, 1936, during testing of its flight performance

fell below the calculated ones due to the underdevelopment of the engines. During the next test flight, on July 3, an accident occurred near the Khimki railway station near Moscow. At an altitude of 2900 m and a speed of 260 km / h, a strong shaking began, after which the right wing broke. The crew managed to leave the destroyed plane on parachutes in time. After this accident, work on the already laid series was stopped, the development of the ANT-41bis understudy with floats instead of wheels was delayed and was soon stopped.

Characteristics of the T-1 (ANT-41): crew - 4 people, power plant - 2 x M-ZAFRN with a capacity of 1275 hp each. s., wing span - 25.73 m and its area - 88.94 mg, aircraft length - 15.54 m, height - 3.86 m, empty weight - 5846 kg, takeoff weight - 8839 kg, maximum speed - 435 km/h, range - 4200 km, practical ceiling - 9500 m, armament - 3 ShKAS machine guns of 7.62 mm caliber, 2 torpedoes or 1000 kg of bombs.

Ta-1/Ta-3 (OKO-6)

In 1939, under the leadership of Vsevolod Konstantinovich Tairov, who graduated from the Moscow Aviation Institute in 1933 and worked in 1934-1935. deputy to N.N. Polikarpov, an escort fighter OKO-6 (experimental design department) with M-88 engines was created. The main purpose of the OKO-6 was the fight against enemy aircraft and tanks. The construction of the first copy of the OKO-6 was completed on December 8, 1939, the first flight of the machine took place on January 21, 1940. During the tests, a number of shortcomings were revealed, so the aircraft was sent for revision. After eliminating the shortcomings, a new spaced tail unit was installed on the aircraft and the fuselage was lengthened.

The second prototype with M-88R engines took off for the first time on October 31, 1940, at the end of December it was given the designation Ta-1. Upon completion of the tests, the department V.K. Tairov was instructed to build and present for state tests an aircraft under the designation Ta-3 in two versions: the first with two M-89 engines - by May 1, 1941, and the second with M-90 engines - by October 1, 1941. To speed up testing in Ta-3, it was proposed to convert the first copy of OKO-6; by April 28, 1941, the conversion of the first copy of OKO-6 into Ta-3 was completed.

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Tests of the Ta-3 with M-89 engines took place from May 12 to July 10, 1941, according to the test results, the Ta-3 was recommended for serial production as an aircraft and tank destroyer. But in the conditions of the outbreak of war, it was not possible to launch the aircraft into a series, and on October 29, 1941, when flying to the city of Kuibyshev V.K. Tairov died in a plane crash.

The design bureau, left without its chief designer, in 1942 introduced the latest version of the Ta Zbis with M-89 engines, which differed from its predecessor mainly in a larger wing area and increased fuel capacity. However, as a result, the take-off and landing characteristics deteriorated and the maximum speed slightly decreased. All this and the unreliable operation of the engines did not allow the Ta-3 aircraft to be put into production. At the end of 1942, the design bureau of V.K. Tairov was disbanded.

Characteristics of the Ta-3: crew - | man, power plant - 2 x M-89 with a capacity of 1150 liters. s., wing span - 14.0 m and its area - 33.5 mg, length - 12.2 m, height - 3.76 m, empty weight - 4450 kg, takeoff weight - 6626 kg, maximum speed - 595 km/h, range — 2065 km, rate of climb — 909 m/min, service ceiling — 11,000 m, armament — 1 ShFK-37 37 mm cannon, 2 MP-6 23 mm cannons and 2 ShKAS machine guns 7.62 mm.

TB-1

In 1925, under the leadership of A.N. Tupolev, the ANT-4 all-metal aircraft was developed, the first prototype aircraft with two English-made Marleg Pop engines took off on November 26, 1925. Taking into account the results of flight tests of the prototype, in February 1928 the second prototype was built under the designation TB-1 (heavy bomber). TB-1, equipped with more powerful engines VMUU Uÿ, from July 1928 to March 1929 passed a set of factory and state tests.

In July 1926, the ANT-4 set two world records for flight duration with a payload. In 1929, the aircraft “Country of Soviets” (specially prepared ANT-4) flew from the USSR to the USA along the route Moscow-Omsk-Khabarovsk-Petropavlovsk Kamchatsky —

Attu Island-Seattle-San Francisco-New York, covering 141 hours 45 minutes of flight time 21,242 km.

Bombers TB-| after the development of the required resource in the air units, they were transferred to civil aviation, where they continued to be operated under the designation G-1 (cargo). G-1 flew in Central Asia, transporting sulfur from deposits discovered in the Karakum to Ashgabat. Some of the machines successfully worked in Polar Aviation. For example, in February-March 1934, they participated in the operation to rescue the crew and passengers from the Chelyuskin steamer, crushed by ice in the Chukchi Sea. In March-May 1938, they took part in rescuing people from a caravan of 8 ships that were covered in ice in the Laptev Sea.

In 1931, twelve TB-1 aircraft were handed over to the first experimental airborne detachment. On these machines, the means of parachute and non-parachute landing of cargo (military equipment, fuel, equipment) and people, which were developed in the Oskonburo P.I. Grokhovsky, the so-called "airbuses" and "hydrobuses". In 1932, they successfully tested the PD-O parachute system for dropping a 76-mm mountain gun mod. 1909. The cannon was hung between the landing gear of the TB-I bomber, and the parachute in a special container was attached to the bomb rack under the fuselage. Later, the Oscon Bureau for TB-1 made a PD-M2 ventral suspension for two Harley-Davidson motorcycles with sidecars. Based on the same carrier, the PD-A parachute suspension was designed for the Ford-A (or GAZ-A) passenger car. In the Oscon Bureau, the car was converted into a pickup truck, in the back of which a DRP dynamo-active cannon was mounted. The car received reinforced springs, wheel caps and a fairing in front of the radiator.

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In the same 1932, a sample of the G-43 (PD-T) system was made for dropping the T-27 tankette with a parachute. Since the weight of the tankette significantly exceeded the maximum allowable load of the TB-1 bomber, the tankette had to be lightened by 334 kg, removing everything that was possible, and even draining water from the cooling system. The plane also had to be lightened. In particular, one of the rear turrets and all machine guns were dismantled, and the fuel supply was significantly reduced. In December 1932, the PD-T system was tested at the Air Force Research Institute; it became the prototype of a large number of such devices designed

for landing light tanks, armored vehicles and vehicles.

TB-1 has been widely used in various experimental developments. In 1933-1934. on TB-1 aircraft (Xo 614 and 726) solid propellant boosters were tested. From 1931 to 1935, TB-1s were used in the development of methods for refueling aircraft in flight. Similar work was carried out at that time in England at the firm "Handley Page". There, too, bombers were converted into tankers to enable aircraft to make transatlantic flights. In the first experiments with TB-I, an R-5 aircraft was used as a tanker, then TB-1 was used as a tanker for refueling I-15 and I-16 fighters, and finally, TB-1 was used for When refueling combatant TB-1 bombers that were equipped with additional equipment for in-flight refueling, during the refueling procedure, the refueling hose must be caught by hand on the refueling aircraft, this work was usually carried out by the gunner. In 1932, work was carried out to assess the possibility of installing additional tanks on the aircraft.

In 1931, TB-1 was successfully tested as an aircraft carrier as part of V.S. Vakhmistrova, ace 1933 to 1939 was used in the work on the "telemechanical aircraft". At the beginning of 1930, V.S. Vakhmistrov experimented with installing vertically downward firing 76 mm dynamo-reactive cannons on the TB-1, designed to destroy ground targets. This idea V.S. At the end of the war, the Germans tried to embody Vakhmistrov when creating their anti-tank aircraft Ru 190. At an angle of 70 ° to the vertical axis, a battery of six dynamo-reactive guns was placed on the Yem 190, but the Germans did not manage to finish it before the end of the war.

As military transport aircraft, TB-1s were used during the fighting in July 1938 near Lake Khasan, and in the summer of 1939 on the Khalkhin-Gol River. Part of the TB-1 aircraft was still in service with the Air Force and the Navy when the Soviet-Finnish war began. During the Great Patriotic War, TB-1s were used as transport, landing, patrol and reconnaissance aircraft, as well as for transporting glider trains (TB-1 could tow up to 9 gliders behind it).

During the serial production of TB-1 from July 1929 to 1933, 216 examples were built in various modifications, including 55 float-operated TB-IP. They were used in coastal regions, mainly in the Far East for patrolling. The civilian version of the float version, operated in the Main Northern Sea Route, had the designation G-1. Some GB-1 aircraft were equipped with skis for use in the northern regions of the country.

Characteristics of TB-1: crew - 6 people, power plant - 2 x M-17 with a capacity of 680 hp each. s., wing span - 28.7 m and its area - 120.0 m", length - 18.0 m, empty weight - 4520 kg, takeoff weight - 6810 kg, maximum speed - 207 km/h, range - - 1000 km, rate of climb - 170 m / min, practical ceiling - 4830 m, armament - 6 PV-1 machine guns of 7.62 mm caliber and 1000 kg of bombs.

TB-3 (ANT-6)

In May 1926, in TsAGI, the brigade of V.M. Petlyakov under the general supervision of A.N. Tupolev began the development of the ANT-6 heavy bomber. This aircraft, equipped with four

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engines, was a further development of the TB-1 (ANT-4). The first prototype took off on December 22, 1930. The positive results of flight tests became the basis for accepting the bomber under the designation TB-3 with M-17F engines for mass production, which began in 1932. Subsequently, serial machines were equipped with more powerful and high-altitude engines, first M-34, and then M-34RN and M-34FRNV.

On ANT-6 aircraft with M-34R engines in 1933-1934. three large international flights were made - to Warsaw, Paris and Rome. In 1937, four ANT-6s landed the scientific group of I. Papanin on the ice field of the North Pole and safely returned to the mainland. Under the brand name G-2 (cargo-second), ANT-6 vehicles were operated for many years on civil aviation lines.

Since 1935, the ANT-6 aircraft began to be widely used as a military transport aircraft. He took on board 30-35 paratroopers, guns, tankettes. In November 1935, the TB-3 was tested at the Air Force Research Institute as a director of anti-tank minefields. T-27 mines were dropped from an aircraft flying at an altitude of 300 m.

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In 1934 P.I. Grokhovsky began work on the installation of conventional guns on bombers, which were in service with the ground units. Initially, the TB-3 was equipped with one 76-mm regimental cannon, model 1927, removed from the standard carriage. It was installed under the fuselage in a cradle at a distance of 600 mm from the bottom surface. Tests were carried out from 15 to 18 December 1934, first on the ground and then in the air. In the conclusions based on the test results, it was noted that firing from field guns with a caliber of up to 76 mm inclusive from aircraft is possible. P.I. Grokhovsky began work on a more powerful version of the TB-3 aircraft, which he called the "flying battery".

In December 1935, the heavy attack aircraft P.I. Grokhovsky G-52 (“flying battery”), which was a serial bomber TB-3 with M-17 engines, armed with cannons. An anti-aircraft gun of 76 mm caliber was installed in the nose of the fuselage of the Th-3, and two field guns of 76 mm caliber were installed in the wing consoles. The main purpose of the G-52 was fire support for landing operations. The firing range of the guns was 18 km, the pilot carried out aiming by turning the aircraft. For aiming, a bar with a simple mesh sight was installed in front of the ship's commander's visor.

Loading of all guns for firing was carried out in the usual way, manually. To this end, next to the breech, loader jobs were equipped - small seats and racks with flat spring sockets for shells. Fire control was carried out with the help of light signaling. The commander of the ship had a remote control with three switches and colored lights. Each loader had small remotes. Turning on the switch on the remote control, the pilot gave a signal - to prepare for firing. Having loaded the cannon, the artilleryman answered in the same way that he was ready. Pointing the plane at the target, the pilot pressed the button on the steering wheel, and the gunners' red lamp lit up - "fire", after which a shot was fired. If necessary, the wing cannons could be fired using a remote system. To do this, a special cable wiring went from their triggers to the fuselage.

In 1937-1938. research was carried out on the TB-ZR aircraft with cargo suspensions PG-12 and DTP-2, which could carry cars, tanks, armored cars and guns.

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In May 1937, the TB-ZR was tested with the “manufactured cabin of Senior Lieutenant Gerasimov”. This cockpit was a single-seat cruciform tail aircraft with an empty cockpit weight of 133 kg. The cockpit was suspended on four braces under the center section of the TB-3, and the navigator got into the cockpit in flight through a special hatch. A cab was produced on a cable with a diameter of 6.2 mm and a maximum length of 500 m with

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help: manual winch. A cable 500 m long ensured an excess of the aircraft over the cockpit by 200 m at a lagging angle of the latter of 70-75°. The extended cockpit had elevators and rudders, by manipulating which the navigator could maneuver the cockpit so that the carrier aircraft went above the clouds or in them, and the cockpit moved on a leash under the clouds. With this type of movement, the enemy anti-aircraft gunners could not determine the position of a bomber flying in the clouds, and getting into a small cockpit was many times more difficult than in a TB-3. Two-way communication between the navigator and the pilot was carried out using a short-wave radio station 6-PK.

In the summer of 1938, the Department of Experimental Designs of the Air Force Research Institute conducted flight tests of the cockpit. Seven flights were performed with a total duration of 20 hours and 55 minutes, five bombs were dropped, two of them during the flight of the aircraft outside the clouds and three during the flight of the TB-3 above the clouds. Tests have shown that when towing at all speeds, the cabin is stable and fully allows for targeted bombing, photographing and visual reconnaissance. Based on the test results, it was decided to build by February 1, 1939 a prototype flying cockpit for the DB-3 and TB-ZRN bombers to conduct full state tests with the involvement of air defense systems. However, due to the lack of funds for the design and construction of a prototype, the work was stopped.

In October 1937, a television installation, created on a Soviet order by the American company KSA, was tested on TB-3. The transmission of the image of the area over which the aircraft was flying was carried out at a distance of up to 25 km, the receiving equipment was mounted in a special command vehicle. This system was intended for testing the method of remote control of troops in real time.

me. In 1938, they were developing an improved television station Dolomit of domestic production, designed for aircraft TB-3 and DB-3, but on aircraft it
so it has not been tested.

TB-3s performed well in battles with the Japanese invaders near Lake Khasan and in the area of the Khalkhin-Gol River, where they were used as bombers and for landing troops. TB-3s were used during the Soviet-Finnish war of 1939-1940, were used in combat airborne assaults in the Baltic states and Bessarabia in 1940. Only machines of this type participated in the last major pre-war maneuvers of the airborne troops in August 1940. They simulated the capture of the Migalovo airfield near Kalinin (now Tver). First, 26 TB-3 aircraft landed a battalion of paratroopers, then they dropped loads from three P-5s. One TB-3 also parachuted out two motorcycles and two cargo bags. The paratroopers "captured" the airfield and began to receive landing troops. Nine T-37A tanks and two artillery batteries - 76-mm and 45-mm guns - were unloaded from the aircraft.

A certain number of TB-3 aircraft were used as part of bomber aviation in the first months of the Great Patriotic War, as well as for the delivery of urgent cargo to the front line and to partisan areas. The total number of TB-3s built was 820.

Characteristics of TB-3-4AM-34RN: crew - 4-6 people, power plant - 4 x MF-34RN with a capacity of 970 liters each. s., wing span - 41.85 m and its area - 234.5 m?, length - 25.18 m, height - 8.45 m, empty weight - 12,585 kg, takeoff weight - 21,000 kg, maximum speed — 288 km/h, range — 2470 km, service ceiling — 7740 m, armament — 5 ShKAS machine guns of 7.62 mm caliber and 4000 kg of bombs.

TB-4 (ANT-16)

In 1930, under the leadership of V.M. Petlyakov, the development of the heavy bomber TB-4 (ANT-16) began, which was a further development of the TB-3 in the direction of increasing overall dimensions.

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dimensions and flight weight of the aircraft. The TB-4 was powered by six M-34 engines, two of which were mounted in tandem above the fuselage. in the fuselage

there were two bomb bays measuring 5.0 x 1.8 x 1.8 m, each with a nominal load could hang 4000 kg of bombs. Bomb bays of such dimensions in the fuselage were made for the first time in the world. In addition, there were external suspensions, which, in the reloading version, made it possible to increase the bomb load to 10,000 kg of bombs. Defensive armament included two 20 mm cannons and ten 7.52 mm machine guns.

The first flight of the experimental machine took place on July 3, 1933 under the control of test pilot M.M. Gromov. On the very first flight, it turned out that the pilot needed to apply very great efforts to the controls in order for the machine to normally stay in the air. The aerodynamic control surfaces of the aircraft have been improved by increasing their area. A few weeks later M.M. Gromov again took off on the TB-4, but it turned out that now, even with little effort on the controls, the machine begins to respond to them. Ultimately, after a series of design improvements, this problem was solved.

Flight tests ended on September 29, 1933. It turned out that the TB-4 could carry 5000 kg of bombs only at a distance of 775 km, 4000 kg of bombs at a distance of 1000 km, and the ceiling did not exceed 2750 m. According to these characteristics, the TB-4 was inferior to bombardiers - box TB-3. The TB-4 aircraft was not accepted, so all work on it was curtailed at the end of 1933, but all the developments were used to create an even larger ANT-20 Maxim Gorky aircraft.

Characteristics of TB-4: crew - 8-12 people, power plant - 6 x M-34 with a capacity of 830 liters each. s., wing span - 54.0 m and its area - 422.0 m?, length - 32.0 m, empty weight - 21,400 kg, takeoff weight - 33,280 kg, maximum speed - 200 km/h , range - 1000 km, practical ceiling - 2750 m, armament - 2 cannons of 20 mm caliber, 10 ShKAS machine guns of 7.62 mm caliber and 4000 kg of bombs (overload 10,000 kg).

TB-5

In the spring of 1930, under the leadership of D.P. Grigorovich, the development of the TB-5 heavy bomber project began. An aircraft with a spaced tail was to be equipped with two FED engines with a capacity of 800-1000 hp. With.

In the bomb bay there were holders for the internal suspension of bombs with a total weight of up to 2500 kg. As a defensive weapon, there were four PV-1 machine guns, two machine guns each in the nose and tail turrets. During the development process, it turned out that the FZD engines could not be finalized, so each of them was replaced by a tandem installation of two Jupiter-UI engines.

Aircraft started flight tests | May 1931. Tests showed that the aircraft was not climbing well, the takeoff was long, and the maximum speed did not reach 180 km/h. The reason was the poor thrust of the tandem radial engines, especially the rear propellers, due to the unfavorable conditions of their operation. The tests dragged on. In the spring of 1932, in one of the flights conducted by M.M. Gromov, one of the engines caught fire. MM. Gromov managed to bring the car into a sharp descent, knock the flames off the engine and land safely. The tests of the aircraft were never completed, since, according to its scheme, the aircraft was already backward for 1932 and no modernization could help.

Characteristics of TB-5: crew - 12 people, power plant - 4 x "Jupiter-UI" with a capacity of 450 hp. s., wing span - 31.0 m and its area - 150.0 mg, length - 22.1 m, empty weight - 7483 kg, takeoff weight - 12 535 kg, maximum speed - 180 km/h, practical ceiling - 2500 m, armament - 4 PV-1 machine guns of 7.62 mm caliber and 2500 kg of bombs.

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TB-6 (ANT-26)

In 1929, the brigade of V.M. Petlyakova at TsAGI developed a project for a 70-ton aircraft TB-6 (ANT-26) and its transport version ANT-28. The wingspan of this gigantic aircraft was 95 m, and the wing area was about 800 m. The power plant consisted of 12 M-34FRN engines, six of which were mounted on the leading edge of the wing, two on the trailing edge near each wingtip, and four tandem assemblies with pulling and pushing propellers - on supports above the wing. The crew of the aircraft was to consist of twenty people, including four gunners at the fuselage machine gun mounts and four gunners at the gun mounts (1 on top of the fuselage, | tail and 2 wing in pusher engine nacelles). Maximum calculated

the speed of the bomber did not exceed 300 km/h, the payload was 25 tons. A two-seat geometrically similar glider model with a wingspan of 20 m was built and tested in flight with characterization. However, the disappointing results of the development of the TB-4 led to the abandonment of the development of the giant bomber TB-6.

TB-7 (Pe-8)

In July 1934, the brigade of V.M. Petlyakova at TsAGI began the development of a heavy four-engine bomber ANT-42. The first flight of an experimental vehicle with M-100 engines took place on December 27, 1936. During further tests, a maximum speed of 403 km/h and a service ceiling of 10,800 m were achieved, which corresponded to the parameters of the technical assignment. In April 1936, the construction of the second machine began, on which the AM-34FRNV engines with a capacity of 1000 hp were installed. s., the tests of the second machine were completed by July 1938, by that time the serial production of the aircraft under the designation TB-7 had already begun.

In 1939, the TB-7 aircraft was modified for the installation of new AM-35A engines with a capacity of 1200 hp each. s., which made it possible to increase the take-off weight of the machine to 27,000 kg, and the maximum speed to 427 km / h. The range also increased, now the TV-7 could carry a 2,000 kg bomb load for a range of 4,700 km, but the service ceiling dropped to 9,300 m.

Later, due to the shortage of AM-35A engines, some TB-7 aircraft were equipped with M-40 diesel engines, which led to a significant increase in flight range. However, the M-40 proved to be unreliable, which led to the continued use of the AM-35A engines. But due to the fact that the AM-35A engines were required for the MiG-3 fighters, the ASh-82FN engines began to be installed on the TB-7. The total number of GB-7s built was 93.

The military career of the Th-7 began on August 8, 1941, when aircraft from two squadrons of the 412th long-range bomber regiment from the 81st aviation division bombed Berlin. Two nights later, taking off from an airfield near Leningrad, they again bombed Berlin; each of the bombers carried six FAB-500 bombs weighing 500 kg each. In September 1941, TB-7 bombed Nazi-occupied Bucharest, and in 1942 Pe-8

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(as TB-7 became known after the death of V.M. Petlyakov) provided support for the Soviet troops during the defense of Stalingrad, carrying out bombing attacks on German positions. On April 5, 1943, during a raid on Koenigsberg, Pe-8 aircraft used for the first time 5000-kg bombs (FAB-5000NG), designed for accurate attacks on special targets; in June, such bombs were used in the battle of Kursk against tank formations. Wehrmacht.

The Pe-8s, with their long range, were used during the war to carry VIPs. For this purpose, two aircraft (70 91 and 92) in the rear of the fuselage instead of the bomb bay were equipped with a passenger cabin for 12 people, it was equipped with a luggage compartment, a buffet, a toilet and three berths. On May 19, 1942, the Soviet delegation headed by the Minister of Foreign Affairs V.M. Molotov flew on a Pe-8 to London for negotiations with W. Churchill and F. Roosevelt regarding the opening of a second front. To carry out the mission, the Pe-8 was equipped with oxygen equipment. The flight to England, almost 2700 km, lasted 15 hours and took place at altitudes from 3000 to 6000 m.

On May 24, 1942, the Soviet delegation flew on a Pe-8 from Moscow to Washington, where they arrived with three stopovers on May 30. After the completion of negotiations on June 4, the delegation went home, the aircraft landed at the LII airfield near Moscow on June 13, covering a distance of 17,800 km with intermediate landings.

Characteristics of TB-7 (Pe-8): crew - 10 people, power plant - 4 x ASh-82FN with a capacity of 1700 liters each. s., wing span - 39.1 m, its area - 188.68 mg, length - 23.59 m, height - 6.2 m, empty weight - 18,420 kg, takeoff weight - 36,000 kg, maximum speed - 450 km / h, range - 5800 km, practical ceiling - 7000 m, armament - 2 ShVAK cannons of 20 mm caliber, 2 UBT machine guns of 12.7 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber and 4000 kg of bombs.

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TI-28

In 1940, under the leadership of Vladislav Konstantinovich Gribovsky, the author of the G-4 (1926), G-5 (1928), G-8 (1931), G-10 (1933) aircraft and others, the development of a single-seat training fighter G- 28 "Krechet". Aircraft base

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It was powered by the MV-6 engine, the cockpit had the equipment necessary to improve the piloting technique not only during the day, but also at night, at high altitudes. To practice shooting and bombing skills, the vehicle had one ShKAS machine gun, bombs of 10, 25 or 40 kg caliber could be hung on beams under the wing.

The prototype aircraft, designated TI-28, was built in the spring of 1940, and the first flight took place on May 22. TI-28 passed all flight tests, during which it demonstrated good aerobatic properties. To improve the acceleration characteristics, it was recommended to install the MV-BA engine and test the aircraft again, but due to the outbreak of war, all work on the TI-28 was stopped. In 1941, the prototype flew to Sverdlovsk, but its further fate is unknown. The second prototype TI-28, which was under construction, was taken with them during the evacuation of the design bureau, but there was no opportunity to complete its construction at the new location. Under the conditions of the war, further work on the aircraft was stopped, and the team of the Design Bureau V.K. Gribovsky focused on work on the G-1 airframe.

It is interesting that an aircraft of such a class as the TI-28 was developed by the American company Bell during the war, it had the designation XP-77. In May 1942, the US Air Force ordered a batch of 25 aircraft from the company, which were supposed to be used as light fighters against Japanese aircraft. The first flight of the XP-77 prototype took place on April 1, 1944, but due to the loss of air superiority by that time, the order was canceled by Japan.

Characteristics of TI-28: crew - ÿ person, power plant - | x MV-6 with a capacity of 240 liters. s., wing span - 9.0 m and its area - 11.6 m ”, length - 7.66 m, height - 2.8 M, empty weight - 807 kg, take-off weight - 1157 kg, maximum speed height - 275 km/h, range - 500 km, practical ceiling - 6600 m, armament - | 7.62 mm ShKAS machine gun and 80 kg of bombs.

YEW

In 1940, under the leadership of N.N. Polikarpov, taking into account the experience of creating VIT-I, VIT-2 and SPB, a two-seat heavy escort fighter TIS with two

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engines AM-35A or AM-37. The construction of three copies of the aircraft was included in the pilot construction plan for 1941.

The first experimental vehicle TIS (A) with AM-37 engines, two ShVAK cannons, two 12.7 mm machine guns and a ShKAS machine gun on a turret was built by March 15, 1941, its testing began already during the war. The first flights took place on August 30 and 31, 1941, then all work was interrupted due to the evacuation of the Design Bureau to Novosibirsk. At the beginning of 1942, the tests of the first machine were resumed, however, due to problems with the AM-37 engines, which required frequent replacement, the tests of the first machine were completed in April 1942, and the second experimental machine TIS (2A) was completed only in 1943

It was decided to remake the aircraft for more reliable AM-39 engines, at the end of December 1943 the project of the new modification was approved. The armament of the aircraft was extremely powerful and contained: a bow cannon battery of two ShVAK cannons, a center-wing mount of two NS-45 45 mm cannons, an upper defensive mount for a UB machine gun and 1000 kg of bombs on an external sling. The first flight of the prototype, which received the designation TIS (MA), took place on June 13, 1944; tests continued until September 16. On

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The tested machine was powered by AM-38F engines from the Il-2 attack aircraft due to the unavailability of the AM-39 engines. The flight data of the TIS with AM-38F engines practically did not differ from the calculated ones, however, the aircraft did not go into production. The main reason was that only 79 Pe-8 (TB-7) long-range bombers, for which TIS was intended to escort, were produced. Since there were no other bombers of this class in our aviation, the need for TIS disappeared.

Characteristics of TIS (MA): crew - 1 person, power plant - 2 x AM-38F with a capacity of 1700 liters each. s., wing span - 15.5 m and its area - 34.85 m", length - 11.7 M, height - 4.35 m, empty weight - 6281 kg, takeoff weight - 8280 kg , maximum speed - 535 km / h, range - 1720 km, rate of climb - 556 m / min, service ceiling - 10,250 m, armament - 2 NS-45 guns of 45 mm caliber, 2 ShVAK guns of caliber 20 mm, 1 UB machine gun of 12.7 mm caliber and 1000 kg of bombs.

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Tu-1

In May 1944, OKB A.N. Tupolev was given the task of building two prototypes of a new machine, the prototype for which was one of the Tu-2 variants. The new machine was developed in two versions.

The first version of the aircraft, the high-speed long-range bomber SDB, was to be equipped with two AM-37 engines. The task of the SDB was to develop a new power plant and test the very concept of modification. The second version of the machine was multi-purpose, it could be used as a fighter-interceptor, photo reconnaissance or high-speed bomber. For operations at night and in conditions of poor visibility, the aircraft provided for the installation of radar equipment of the PNB-4 type or the Gneiss-5 type.

An experimental machine with two AM-39UV engines with a power of 1640 hp each. With. each was completed in early 1945, compared to the Tu-2, it had less weight and dimensions. The first flight took place on May 21, 1945, during the tests high flight characteristics were demonstrated: maximum speed 680 km/ h, range 2500 km, service ceiling 10,000 m. 23 caliber 23 mm and one gun ShVAK caliber 20 mm. The aircraft was mass-produced with AM-43BS engines with a power of 1900 hp each. With. every. |

Characteristics of the Tu-1: crew - 3 people, power plant - 2 x AM-43V with a capacity of 1950 hp each. s., wing span - 18.86 m and its area - 48.8 m?, length - 13.6 m, empty weight - 9460 kg, takeoff weight - 14 460 kg, maximum speed - 641 km/h, range - 2250 km, rate of climb - 431 m / min, practical ceiling - 11,000 m, armament - 2 ShVAK cannons of 20 mm caliber, 3 UBT machine guns of 12.7 mm caliber and 4000 kg of bombs.

Tu-2

Work on a front-line bomber with AM-37 engines began at the end of 1939 at OKBA.N. Tupolev. In January 1941, the first prototype under the designation “103” (ANT-58) began testing, and in May it was joined by an improved version of the aircraft “103U” (ANT-59), which was distinguished by more powerful weapons. In

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During testing, both machines showed high flight performance.

The decision to launch the 103U aircraft in series was made in July 1941. In the conditions of the outbreak of war, it was not possible to equip the aircraft with AM-37 engines, which were discontinued, so the project was redone for the M-82 engines used on attack aircraft IL-2. In December 1941, tests began on a prototype of a new version of the aircraft, which first received

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designation "103V" (ANT-60), and then Tu-2. In 1942, Tu-2s began to be mass-produced; in the summer, two regiments were formed out of 63 built aircraft, which were transferred to the Kalinin Front. Small series of Tu-2 aircraft began to be sent to combat units by September 1942, however, the mass flow of aircraft to units began only at the end of 1943. ASh-82FN engines and reinforced defensive weapons (instead of 7.62 mm machine guns, 12.7 mm were installed). In the battle for Kursk, Tu-2 aircraft from the 285th Air Division were used to bombard German positions behind the front line. More than 600 Tu-2 vehicles took part in the massive offensive of the Soviet troops against Finland, launched on June 9, 1944, they bombed enemy positions in Kiviniemi, Valkijärvi, Kivennope and others. Tu-2 and Pe-2 vehicles attacked Koenigsberg before our troops occupied it. Tu-2s also took part in the battle for Berlin, on the very first day of the battle they dropped 97 tons of bombs on enemy positions. In September 1945, many Tu-2 aircraft took part in combat operations against the Japanese army in the Far East.

The Tu-2 was mass-produced until 1951, after the war it was in service not only with the Soviet Air Force, but also with the Air Forces of Poland, Hungary, Romania, Bulgaria, China and North Korea. A total of 2547 aircraft were built, including the following modifications:

Tu-2D (ANT-62) - with ASh-83 engines with a power of 1900 hp each. with., increased by 3.34 m wingspan, a crew of 5 people, a range of 2790 km;

Tu-2T (ANT-62T) - a torpedo bomber with ASh-82FN engines and an additional fuel tank in the bomb bay, took off for the first time after the end of the war;

Tu-2SDV (ANT-63) - with AM-39 engines, with a maximum speed of 640 km/h;

Tu-2S4 - two-seat version with 2 x 45mm cannons and 2 x 37mm cannons in the nose, some vehicles had a rear defensive cannon and some had a 75mm cannon or a battery of 48 machine guns for attacking ground targets ;

Tu-2R/Tu-2F/Tu-6 - reconnaissance aircraft with photographic equipment in the bomb bay, equipped with ASh-82FN engines, had a wingspan increased to 22.2 m;

Tu-2 "Paravan" - an aircraft for breaking through the lines of barrage balloons.

Characteristics of the Tu-2S: crew - 4 people, power plant - 2 x ASh-82FNV with a capacity of 1850 hp each. s., wing span - 18.86 m and its area - 48.8 m?, length - 13.8 m, height - 4.55 m, empty weight - 7474 kg, takeoff weight - 11 360 kg , maximum speed - 550 km/h, range - 2500 km, rate of climb - 588 m/min, service ceiling - 10970 m, armament - 2 ShVAK guns of 20 mm caliber, 3 UBT machine guns of 12.7 mm caliber and 4000 kg of bombs .

Tu-10

Tu-10 (ANT-68) was the result of the development of the Tu-2 bomber. The aircraft was equipped with two AM-39FNV engines with a capacity of 1850 hp each. with., its crew consisted of four people. The Tu-10 prototype took off for the first time on May 19, 1945. Its flight characteristics in some respects exceeded the corresponding parameters of the Tu-2, for example, at an altitude of 8600 m it developed a maximum speed of 641 km / h, the service ceiling was 10,450 m, but the range was below - 1740 km. A small series of Tu-10s was produced between 1945 and 1947.

TShB (ANT-17)

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In 1933, TsAGI began designing the ANT-17 aircraft, the military designation being TSHB (heavy armored attack aircraft). It was intended to destroy enemy ground troops behind the front line, it needed heavy armor to protect it from ground fire. General

ANT-17

the weight of the armor was about 1000 kg, about a third of it was on the lower part of the fuselage as a load-bearing structure to support the load. The power plant consisted of two M-34 engines, the aircraft was armed with six machine guns, including a mobile twin mount and four fixed machine guns for firing forward, and carried 1,500 kg of bombs under the wing. But due to the fact that the Air Force revised its requirements for an attack aircraft, all work on the TSHB was stopped even before the completion of the construction of the prototype.

U-2 (Po-2)

In 1927, under the leadership of N.N. Polikarpov developed the U-2 aircraft, which was intended for the initial training of pilots. For many years, the U-2 aircraft were the only initial training aircraft in flight schools and flying clubs in our country; almost 100,000 pilots were trained on this aircraft during the war years.

In 1936-1938. at MAI under the direction of P.D. Grushin developed and tested a modification of the U-2 aircraft with a 180 hp steam engine. With. In 1937 N.A. Chechubalin developed a caterpillar chassis for the U-2, which was supposed to solve the problem of improving the aircraft's maneuverability on wet, viscous, water- and mud-covered soil, on melting snow cover, etc., where take-off on wheels is difficult or impossible. The caterpillar track was made in the form of textolite rods with a diameter of 50 mm and a length of 0.3 m, enclosed between the side guide walls of the box, along

ARCHIVAL MATERIALS, 1943. Three-color camouflage scheme for U-2 aircraft

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shape reminiscent of the hull of early tanks. Tests showed that the tracks had exceptional cross-country ability, they worked in all conditions, did not get clogged, did not fail. The disadvantage of the tracked chassis was the comparative design complexity, labor intensity and somewhat pain.

greater mass and resistance compared to wheels. This hindered their implementation.

During the war, the U-2 was used as a light night bomber. Several aviation regiments were formed, armed with U-2 aircraft, they carried out bombing attacks on the front line and near rear of the enemy. One of these regiments was fully staffed with girls, pupils of flying clubs. During the three front-line years, the regiment made almost 24,000 sorties. U-2 aircraft in 1944 after the death of N.N. Polikarpov was renamed Po-2.

An agricultural version of the U-2AP aircraft was produced, as well as a three-seater transport version. In total, the country's aircraft factories built about 40 thousand different versions of the U-2 (Po-2) aircraft, which became the most popular light-engine aircraft in the history of domestic aviation and was in operation for more than 35 years.

Characteristics of the U-2: crew - 2 people, power plant - 1 x M-11D with a capacity of 115 liters. s., wingspan - 11.4 m, their area - 35.15 mg, length - 8.7 m, height - 3.1 m, empty weight - 770 kg, take-off weight - 1350 kg, maximum speed - 152 km / h, range - 530 km, practical ceiling - 3000 m, armament - 1 ShKAS machine gun of 7.62 mm caliber, 4 NURS RS-82 and 240 kg of bombs.

U-5

In 1934, under the leadership of V.V. Nikitin, the U-5 training and sports biplane aircraft with the M-11 engine was developed. Tests of an experimental machine took place in 1937, and based on the test results, an experimental series of 12 machines was built. In 1942, a prototype of the U-5 (LSh) aircraft with the MG-31F engine was built; this machine was built in 1942-1944. was used as a light staff aircraft.

Characteristics of the U-5: crew - 2 people, power plant - | x M-11 with a capacity of 100 liters. With. or | x MG-31F with a capacity of 130 hp. s., wingspan - 9.84 m and their area - 25.53 m2, length - 7.75 m, height - 2.78 m, empty weight - 700 kg, takeoff weight -1400 kg, maximum speed - 272 km /h, range — 480 km, service ceiling — 4500 m, armament — | machine gun ShKAS caliber 7.62 mm and 4 NURS RS-82.

UT-1

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The training aircraft UT-1 (AIR-14) was created in 1936 in the Design Bureau of A.S. Yakovlev. The aircraft, originally equipped with the M-11 engine, was intended mainly for training commanders of fighter units and instructors. In 1937, the aircraft was finalized, a more powerful M-IG engine was installed on it, after which it was recommended for mass production, and the M-11E engine was installed on later modifications of the UT-I.

In 1937, the float version of the UT-1 aircraft set an international distance record for aircraft of this class; it flew from Moscow to Ufa (1174 km in a straight line). In the same year, it set a speed record for float planes - 218 km / h at a distance of 100 km.

In the spring of 1942, in the conditions of an acute shortage of aircraft at the fronts, the aviation of the Black Sea Fleet began work on converting UT-1 training aircraft into combat aircraft adapted for night operations. UT-1s were equipped with two ShKAS wing-mounted machine guns and two beams for launching RS-82 missiles. These aircraft, designated UT-16, took part in providing close air support to our troops during the defense of Sevastopol and in the battles for the Caucasus. They destroyed enemy trains with ammunition, ensured the actions of the MBR-2 and U-2 night bombers by destroying searchlights and suppressing enemy anti-aircraft gun emplacements.

Characteristics of UT-1: crew - | man, power plant - 1 x M-11 with a capacity of 100 liters. With. or | x M-PE with a capacity of 150 hp. s., wing span - 7.3 m and its area - 9.58 m", length - 5.75 m, height - 2.34 m, empty weight - 420 kg, take-off weight - 590 kg, maximum speed — 249 km/h, range — 670 km, practical ceiling — 6180 m, armament — 2 ShKAS machine guns of 7.62 mm caliber and 4 NURS RS-82.

UT-2

In 1937, the serial production of the UT-2 training aircraft, developed in the design bureau of A.S. Yakovlev. Serial cars were produced with the M-PE engine. UT-2 has become one of the main training aircraft in military schools and flying clubs. The float version of the UT-2 set three global

Three-color camouflage scheme for UT-2 aircraft

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record in its class. In 1941, the upgraded UT-2M aircraft appeared.

In 1942 OKBA.S. Yakovleva developed a variant of the armed aircraft UT-2V, intended for training in bombing in aviation pilot schools and colleges. The aircraft was mass-produced. Based on the UT-2V, the UT-2MV aircraft with the M-11F engine was built, which was intended for combat use at the front as a light bombardier. Four holders were installed under the wing of the aircraft, which provided the suspension of four 50 kg bombs with one crew member or two 50 kg bombs with two crew members. Alternatively, it was possible to hang eight RS-82s and two 50 kg bombs with one

crew member.

From 1938 to 1946, 7243 UT-2 aircraft of various modifications were built, the aircraft was supplied to Poland, Bulgaria, Hungary and Romania.

Characteristics of UT-2: crew - 2 people, power plant - | x M-PE with a capacity of 150 liters. s., wing span - 10.2 m and its area - 17.2 m ?, length - 7.0 m, height - 2.55 m, empty weight - 616 kg, takeoff weight - 856 kg, maximum speed speed - 230 km/h, range - 500 km, practical ceiling - 3500 m, armament - 1 ShKAS machine gun of 7.62 mm caliber and 4 NURS RS-82.

UT-3

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In 1937, in the design bureau of A.S. Yakovlev developed the UT-3 (AIR-17) training aircraft, which was intended for the education and training of crews of large aircraft (both military and civil). In early 1938, a prototype aircraft equipped with two MV-6 engines began flight tests. Based on the test results, the aircraft was recommended for serial production, the first serial machine under the designation UT-3 was built in September 1939. In the process of serial production, the machine was refined, it received more powerful MV-BA engines. The production of the aircraft was stopped with the beginning of the war, in total about 20 aircraft were built, which were in service in the training regiments.

Characteristics of UT-3: crew - 3 people, power plant - 2 x MV-6 with a capacity of 220 liters each. s., wingspan -

15.0 m and its area - 33.42 m", length - 10.7 m, height - 3.56 m, empty weight - 1789 kg, takeoff weight - 2627 kg, maximum speed - 345 km / h, range - 600 km, practical ceiling - 6500 m, armament - 2 ShKAS machine guns of 7.62 mm caliber and 200 kg of bombs.

KhAI-1

In 1932, at the Kharkov Aviation Institute under the leadership of I.G. Neman, the KhAI-1 aircraft equipped with the M-22 engine was developed. It was the first aircraft in the Soviet Union with retractable landing gear in flight. It was developed in passenger and military variants (KhAI-IV).

The first flight of the aircraft took place on October 8, 1932, during the tests the speed of 300 km/h was repeatedly reached, which at that time was the highest achievement for light passenger aircraft. In total for 1934-1937. 43 KhAI-1 aircraft were produced, which were successfully used on the air line Moscow-Simferopol and others. In the military version, the aircraft was a two-seat training bomber armed with two machine guns and 200 kg of small bombs in the fuselage.

Characteristics of KhAI-1: crew — 1 person + 6 passengers, power plant — | x M-22 with a capacity of 480 liters. s., wing span - 14.8 m and its area - 33.2 m?, length - 10.2 m, empty weight - 1630 kg, takeoff weight - 2600 kg, maximum speed - 324 km/h, range — 1130 km, practical ceiling — 7200 m.

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In 1938-1939. OKB S.A. Kocherigina created two prototypes of a light attack aircraft based on the R-9 (SR) high-speed reconnaissance aircraft: the Sh-1 with the M-88 engine and the Sh-2 with the M-87A engine.

The Sh-1 aircraft was armed with two ShVAK cannons and two ShKAS machine guns in the wing, one ShKAS on the turret and 200 kg of bombs. It was tested at the Air Force Research Institute in July 1939, the test results were recognized as unsatisfactory due to a lack of engine power, which reduced the maximum speed below the calculated value, unsuccessful surface finish of the aircraft, etc.

By mid-November 1939, the state tests of the second model Sh-2 were completed. The aircraft developed a maximum speed of 439 km/h at an altitude of 4700 m, climbed to 5000 m in 9.5 minutes, the flight range was 1300 km, the practical ceiling was 9800 m.

In December 1939 S.A. Kocherigin presented a project for the modification of the Sh-1 aircraft - the BMSh attack aircraft (large modification of the attack aircraft) with the M-90 engine. The composition of the armament could vary depending on the combat mission of the aircraft: a light attack aircraft, an attack aircraft with an extended flight range, a cannon attack aircraft and a cannon attack aircraft with an increased

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flight range. The BMSh had the following design characteristics: take-off weight - 3700 kg, maximum speed at an altitude of 8000 m - 580 km/h, time to climb 5000 m - 8.4 minutes, service ceiling - 11,000 m. However, the project was not implemented.

By the summer of 1940, on the basis of the Sh-2 aircraft, a project of a small modification of the MM attack aircraft with an M-81 engine with a power of 1280 hp was developed. With. The armament consisted of four ShKAS wing-mounted machine guns and 200 kg bombs (400 kg load capacity). MMSh had the following design characteristics: takeoff weight - 3800 kg, maximum speed at an altitude of 5000 m - 520 km / h, climb time of 6000 m - 11.0 minutes. A prototype MMSh was built, tested and, under the designation BB-21, was accepted for mass production at plant No. 1.

Characteristics of Sh-1: crew - 2 people, power plant - | x M-88 with a capacity of 1100 liters. s., wing span - 12.0 mi, its area - 24.15 m ', length - 10.0 m, empty weight - 2806 kg, take-off weight - 3450 kg, maximum speed - 446 km / h, range - 1300 km , practical ceiling - 9820 m, armament - 2 ShVAK guns of 20 mm caliber, 3 ShKAS machine guns of 7.62 mm caliber and 200 kg of bombs.

Sh-2

The amphibious biplane Sh-2, designed by Vadim Borisovich Shavrov, was an enlarged version of the Sh-1 aircraft of his own design. The aircraft was built at the Krasny

pilot "in Leningrad, on November 11, 1930, his first flight took place. In June 1931, state tests were carried out in Leningrad, after which the Sh-2 was put into production in 1932-1934. A sanitary version of the Sh-2S aircraft was also serially built. On it, behind the front seats, where the pilot and the doctor were accommodated, a cabin for a stretcher with a patient was equipped, covered with a transparent lantern.

Sh-2 aircraft were widely used in the aviation of the Navy, aviation schools, aviation of the border troops and air ambulance. They were widely used on local airlines in Siberia, the Far East and the Far North.

Characteristics Sh-2: crew - 1 person + 3 passengers, power plant - | x M-11 with a capacity of 100 liters. s., wing span - 13.0 m and its area - 24.6 m?, length - 8.2 m, take-off weight - 937 kg, maximum speed - 139 km/h, practical ceiling - 3850 m, armament - 2 DA machine guns of 7.62 mm caliber and 200 kg of bombs.

Sh-7

In 1939 V.B. Shavrov, who was appointed chief designer of an aviation plant in 1935, designed a 6-seater amphibious flying boat intended for operation in the Far North. In 1940, a prototype equipped with the MG-31F engine was tested, after which the aircraft was launched into a series under the designation Sh-7, built in both civil and military versions. In the military version, one ShKAS machine gun was mounted on the aircraft for rear protection. During the war, the Sh-7 was used in wheeled and ski versions for the transport of urgent cargo on the Volga.

Characteristics of the Sh-7: crew - 2 people, power plant - 1 x MG-31F with a capacity of 330 hp. s., wing span - 13.0 m, its area - 23.3 m?, length - 9.4 m, empty weight - 1230 kg, takeoff weight - 1900 kg, maximum speed - 220 km / h, range - 920 km , practical ceiling - 3000 m, armament - 1st ShKAS machine gun of 7.62 mm caliber.

"Sh-tandem" ("Tandem-MAI") / BB-MAI

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In the mid 30s. in OKB-1 of the Moscow Aviation Institute (MAI), which was headed by P.D. Grushin, the aircraft "Stal" MAY, U-2 were developed with an experimental

power plant and other aircraft. Among them was the Oktyabrenok light aircraft of the monoplane-tandem scheme.

The Oktyabrenok aircraft, unlike the Sky Flea aircraft, widely known in those years, by the French aircraft designer Mignet, the front and rear wings were fixed, but on the front wing there were flap elevons along the entire span. The aircraft was controlled by elevons, which served as the elevator, flaps, rudder and ailerons. The rear wing was rigidly attached to the fuselage and had no controls.

The first flight of the Oktyabrenko took place on October 23, 1936. At first, the Aube-Dune engine with a capacity of 27 liters was used as a power plant. s., then "Bristol-Cherub" with a capacity of 30 liters. s., after a series of improvements, the Salmson engine with a capacity of 45 liters was finally installed. With. After state tests, the aircraft was transferred to the Air Force as a liaison aircraft, in 1938 the Oktyabrenok participated in the air parade in Tushino.

Based on the experience gained while working on Oktyabrenko, in 1936-1937. in OKB-1 MAI under the direction of P.D. Grushin, a project was developed for an attack aircraft with an M-87 engine. Attack aircraft "Sh-tandem" ("Tandem-MAI") had features - the rear wing (45% of the area of the front wing) had a spaced vertical tail in the form of keel washers located in the middle of the span, and elevons, which also performed the functions of elevators which were not on the front fender. The gunner's turret was located in the tail section of the fuselage. The aircraft was built in the MAY training and production workshops. The first flight of a single-seat prototype took place on December 5, 1937; flight tests were completed in 1939. According to the test results, the construction of a second experimental machine in a two-seat version was recommended. The armament consisted of four ShKAS wing machine guns, one ShKAS machine gun on the turret and 200 kg of bombs. The second machine, equipped with the M-87A engine, was undergoing flight tests in September-October 1939. As a result of the tests, it turned out that the flight characteristics of the machine were below the specified ones, the navigator’s cockpit was cramped, the strength of the front wing was insufficient, etc. It was proposed to transfer the aircraft to TsAGI for the study of aerodynamic characteristics, modify it and submit it for the second time for state tests. Although the construction of an understudy aircraft "Sh tandem" and began, but soon

It was decided to stop work on this aircraft.

The results obtained during the tests were used in the design of an aircraft - a short-range bomber and attack aircraft BB-MAI with a more powerful M-105 engine. The construction of the prototype, which, unlike the Sh-tandem, was carried out according to the normal scheme, ended in 1941, it was already undergoing flight tests, but the outbreak of war stopped all further work on the BB-MAI.

An interesting fact: the English company Westland, which has been mass-producing the Lysander biplane aircraft of the usual design since 1937, at the end of 1940 developed its modification, which completely repeated the scheme of the Sh-tandem aircraft. This modification had a rear wing in tandem with the front wing; a gunner's turret was installed in the rear fuselage, equipped with four Mazÿ & Tÿotrsop machine guns. Modernized Lysander aircraft were tested in the winter of 1940/41 as night fighters. It is also known that at least two modified Lysander aircraft at the end of 1941 were in service with the 138th Squadron of the British Air Force and were used to secretly drop agents of the British special services into the territory of France occupied by the Germans.

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Characteristics of the "Sh-tandem": crew - 2 people, power plant - ÿ x M-87 with a capacity of 930 liters. s., wing span - 11.0 m and its area - 30.4 mg, length - 8.5 M, empty weight - 2560 kg, take-off weight - 3088 kg, maximum speed - 488 km/h , armament - 5 ShKAS machine guns of 7.62 mm caliber and 200 kg of bombs.

Characteristics of BB-MAI: crew - 2 people, power plant - | x M-105 with a capacity of 1050 liters. s., wingspan - 10.0 mi, its area - 16.8 m², length - 9.6 m, empty weight - 2965 kg, take-off weight - 3490 kg, maximum speed - 550 km / h, range - 500 km , rate of climb - 543 m / min, practical ceiling - 9000 m.

Sche-2

In the summer of 1942, under the leadership of Alexei Yakovlevich Shcherbakov, in 1925-1935. who worked in the Design Bureau K.A. Kalinin, and during the war he headed one of the main departments

NKAP and Design Bureau in Orenburg developed the TS-1 transport aircraft with two M-11D engines and spaced vertical tail. The aircraft was intended for the transportation of bulky cargo (fighter wings, engines, anti-tank guns, etc.) weighing up to 1000 kg; for this, the cargo compartment had a large door on the left side.

After the flight tests of an experimental aircraft in October 1943, mass production of machines began under the designation Shche-2. This aircraft was used by the troops for the transportation of people (it took on board up to 16 people), as a cargo, ambulance (11 stretchers), landing (9 paratroopers), as well as training for the training of navigators. Serial production of Shche-2 continued until 1946.

Characteristics of Shche-2: crew - 2 people, power plant - 2 x M-PD with a capacity of 115 hp. s., wing span - 20.48 m and its area - 63.9 m?, length - 14.27 m, empty weight - 2270 kg, takeoff weight - 3400 kg, maximum speed - 157 km/h, range - 1000 km, practical ceiling - 3000 m, payload - 16 people or 1130 kg of cargo.

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By September 1939, under the leadership of Viktor Nikolaevich Belyaev, who had worked at TsAGI since 1926 and was appointed chief designer of the DB-LK long-range bomber in 1939, a project was developed for a single-seat cannon fighter EI (experimental fighter) with engine M-105. The fighter had some features - the pilot was located in the cockpit, which had an automobile-type door, the engine was located behind the cockpit. The design feature of this aircraft was that the engine drove the propeller located behind the wing on the tail boom, and the propeller rotated around the beam. On the tail were three small keels. As weapons, it was planned to install two cannons and two machine guns. However, the project was not accepted for implementation.

After that, V.N. Belyaev, taking into account critical comments on the EI project, redesigned it into a two-beam version of the EI (see the section "Two-beam and twin-fuselage aircraft").

Characteristics of the EI: crew - 1 person, power plant - 1 x M-105TK-2 with a capacity of 1000 liters. s., roof span

la - 11.5 m, takeoff weight - 2640 kg, maximum speed - 712 km / h, service ceiling - 11,600 m, armament - 2 ShVAK cannons of 20 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

Yak-1

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The first experimental fighter I-26 A.S. Yakovlev became the prototype for all his subsequent serial machines. The first flight of the I-26 took place on January 13, 1940, in subsequent flights a maximum speed of 586 km / h was reached. However, on April 27, 1940, a catastrophe occurred, and the test pilot died. Despite this, in the middle of 1940 it was decided to put the aircraft into mass production, in December it was given the designation Yak-|.

The Yak-I aircraft with the M-105P engine (later with the VK-105PF) became one of the lightest fighters of those years, but its armament was quite powerful - one ShVAK cannon and two ShKAS machine guns. Its mass production began in 1941, in the initial period of the Yak-! in terms of its aerobatic and combat qualities, it already occupied a prominent place among our new front-line fighters. At the end of 1941, 4 out of 11 fighter aviation regiments of the Moscow air defense system were armed with Yak-1 aircraft. Here are examples of the successful combat use of the Yak-1. |

On March 20, 1942, southwest of the city of Gzhatsk (now the city of Gagarin, Smolensk region), Captain I.A. Avekov covered from the air on the Yak-1 fighter the positions of the 201st Rifle Division. Entering into battle with seven German BE 109 fighters, I.A. Avekov shot down one plane, a few minutes later another. During the air battle he was wounded in the leg and arm. When the Yak-1 caught fire, I.A. Avekov decided to ram. Having approached the Messerschmitt, he hit him with the wing of his plane and shot him down. He landed at the location of his troops.

Sergeant A.N. Agdantsev July 11, 1943 on the Kursk Bulge, as part of a group of Yak-1 fighters, fought with Junkers ÿi-87 bombers escorted by BE 109 fighters. During the battle, he shot down 3 enemy aircraft. Having used up all the ammunition, he decided to go for a ram. By hitting the right plane on the tail, he shot down one of the Messerschmitts.

ARCHIVAL MATERIALS 1943

Fighter aircraft camouflage scheme

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To the album of camouflage schemes for aircraft

1. This album was developed in accordance with the order of the NKAP of the USSR and the Red Army Air Force Mo 389/0133 dated July 3, 1943.

2. The upper and side surfaces of all fighter-type aircraft are painted in two colors: gray-blue and dark gray according to a single scheme.

3. The upper and side surfaces of all types of aircraft, except for fighter aircraft, are painted in three colors: green, light brown and dark gray.

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4. Location. The color and size of the identification marks remain the same.

5. The lower surfaces of all aircraft, as before, are painted blue.

6. The transition from one color to another can be sharp if the paint is applied with brushes, or blurry when painted with spray guns.

7. Only aircraft under repair are subject to painting according to this album in air units.

8. Coloring should be carried out only with standard paints of the following brands supplied to the aviation unit.

For wood and fabric sheathing

Green: Vet 522545 AMT-4 Light brown color ..... AMT-1 Dark gray color .... AMT-12 Grey-blue ..... AMT-11 Blue .... AMT-7 For metal surfaces | Green color ..... A-24M Light brown color ..... A-21M Dark gray color ..... A-32M Blue color A-28M

Head of the camouflage service of the Red Army Air Force Lieutenant Colonel Yasin July 18, 1943

During the Great Patriotic War Yak-| modified several times. In 1943, two prototypes were built under the designation Yak-1M. The first model with the VK-105PF engine, one ShVAK cannon and one UBS machine gun passed factory tests from February 28 to June 7, state tests from June 7 to July 7, and again on July 21-23, 1943. The second model with the VK-105PF engine , one experienced push

SHA-20M and two UBS synchronous machine guns passed factory tests on September 20-30 and state tests on October 6-15, 1943. During the tests it reached a maximum speed of 651 km/h, turn time 17 seconds, range up to 900 km. According to the test results, the Yak ÿM was recommended for mass production to replace the Yak-1. The Yak-1 was used until the end of the war, these aircraft were flown by the French from the Normandie-Neman squadron and Polish pilots from the 1st Fighter Air Division of the Polish Army. The total number of vehicles built in all variants was 8721 copies.

Characteristics of the Yak-1: crew - 1 person, power plant - 1 x M-105PF with a capacity of 1180 hp. s., wing span - 10.0 m and its area - 17.15 m?, length - 8.48 m, height - 1.7 m, empty weight - 2410 kg, takeoff weight - 2703 kg, maximum speed - 592 km/h, range - 850 km, rate of climb - 926 m/min, service ceiling - 10,000 m, armament - 1 ShVAK cannon of 20 mm caliber, 2 ShKAS machine guns of 7.62 mm caliber and 200 kg of bombs.

Yak-3

In February 1941, the I-30 all-metal fighter, developed in the Design Bureau of A.S. Jacob is left. The aircraft successfully passed state tests, but with the outbreak of war, due to the scarcity of aluminum alloys, it was not launched into the series. In the original version, the I-30 was armed with three 20 mm ShVAK cannons and two 7.62 mm ShKAS machine guns.

They returned to the idea of creating an all-metal fighter in 1943, developing the Yak-IM fighter, which had already justified itself in battles. The new fighter, which received the designation Yak-3, differed from its predecessor by a smaller wing area and a number of aerodynamic and structural improvements. The first serial aircraft Yak-3 was ready on March 1, 1944. The Yak-3 was one of the lightest fighters of World War II. High speed, excellent rate of climb, good ceiling, maneuverability and ease of piloting made the Yak-3

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favorite aircraft of our fighter pilots. In terms of its characteristics, it surpassed the German BE 109 and Em 190 fighters. The total number of Yak-3 aircraft built was 4848 copies.

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Characteristics of the I-30: crew - | man, power plant — | x M-105P with a capacity of 1050 liters. s., wing span - 9.74 and its area - 17.36 m ”, length - 8.48 m, empty weight - 2550 kg, take-off weight - 3130 kg, maximum speed - 571 km / h, range - 975 km, rate of climb - 714 m / min, practical ceiling - 9000 m, armament - 3 ShVAK cannons of 20 mm caliber and 2 ShKAS machine guns of 7.62 mm caliber.

Characteristics of the Yak-3: crew - 1 person, power plant - ÿ x VK-108 with a capacity of 1800 hp. s., wingspan - 9 2 m its area - 14.85 m?, length - 8.5 m, height - 2.42 m, empty weight - 2105 kg, take-off weight - 2830 kg, maximum speed — 745 km/h, range — 1060 km, rate of climb — 1430 m/min, service ceiling — 11,800 m, armament — 1 ShVAK cannon of 20 mm caliber and 2 UBS machine guns of 12.7 mm caliber.

Yak-5

The Yak-5 high-altitude fighter-interceptor with the M-105PD engine was developed in the middle of 1940. Its armament was to consist of one ShVAK cannon and two ShKAS machine guns.

The first flight of an experimental machine took place | December 1940, due to abnormal operation of the engine, the test pilot was forced to land the plane 20 minutes after takeoff. After installing a new engine, the aircraft continued testing until the end of 1942. However, due to continued engine failures, all work on the Yak-5 was stopped.

Characteristics of the Yak-5: crew - 1 person, power plant - 1 x M-105 PD with a capacity of 1140 hp. s., wing span - 9.74 m and its area - 17.15 m², length - 8.48 m, empty weight - 2450 kg, takeoff weight - 2990 kg, maximum speed - 665 km/h, service ceiling - 12,000 m, armament - | 20 mm ShVAK cannon and 2 7.62 mm ShKAS machine guns.

Yak-6 (NBB)

In 1942, OKBA S. Yakovlev developed the Yak-6 (NBB) aircraft with two M-11F engines, which could be used as a short-range night bomber and as a transport aircraft. In bom

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Three-color camouflage scheme for Yak-6 aircraft

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ARCHIVAL MATERIALS 1943

Three-color camouflage scheme for Yak-b aircraft

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the barding version of the aircraft had five holders for bombs with a total weight of up to 500 kg. In the transport version, a compartment for six passengers or cargo was located behind the two-seat pilot's cabin. The aircraft was mass-produced in both versions. In 1943, the aircraft was upgraded and received the designation Yak-6M. It became the prototype for the Yak-8 transport aircraft, which was tested in 1944, but did not go into production.

Characteristics of the Yak-6: crew - 2 people + 6 passengers, power plant - 2 x M-11F with a capacity of 140 hp each. s., wingspan - 14.0 m and its area - 29.6 m, length - 10.35 m, empty weight - 1433 kg, take-off weight - 2350 kg, maximum speed - 180 km / h, range - 580 km, practical ceiling - 3380 m, armament - 1 ShKAS machine gun of 7.62 mm caliber and 500 kg of bombs. |

Yak-7

The Yak-7 fighter was created at the end of 1941 on the basis of the serial training fighter Yak-7UTI (UTI-26). Outwardly, the Yak-7 looked like the Yak-I fighter, it was armed with one ShVAK cannon and two ShKAS machine guns. Serial vehicles with the M-105PA engine, which received the designation Yak-7A, began to enter combat units at the end of 1941. These aircraft could carry six RS-82 rockets or two 100 kg bombs. |

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At the beginning of 1942, the following modification appeared under the designation Yak-7B, which had a more powerful VK-105PF engine, and the ShKAS machine guns were replaced by UBS heavy machine guns. Subsequently, the following modifications of the aircraft were produced: long-range fighter Yak-7DI, fighter. Yak-7 M-82 with M-82 engine, high-altitude fighter-interceptor Yak-7 PD with M-105 PD engine with 1160 horsepower. With. and Yak-7-37 with a 37 mm Sh-37 cannon and two UBS machine guns.

Yak-7 fighters of all modifications were actively used at the front until the end of the war, the total number of aircraft built was 6399 examples.

Characteristics of the Yak-7: crew -- | man, power plant - 1 x M-105PF with a capacity of 1180 liters. s., wing span - 9.74 m and its area - 17.15 m?, length - 8.37 m, height - 2.75 m,

empty weight - 2480 kg, take-off weight - 3370 kg, maximum speed - .615 km/h, range - 825 km, service ceiling - 10,200 m, armament - | gun ShVAK caliber 20 mm, 2 machine guns UBS caliber 12.7 mm 6 NURS RS-82.

Yak-9

The Yak-9 fighter was a further development of the Yak-7DI long-range fighter. Since 1943, the Yak-9 with the VK-105PF engine, armed with one 20 mm cannon and two heavy machine guns, became, in fact, the main Soviet air combat aircraft. It was the most massive type of front-line fighter aircraft in our Air Force during the Great Patriotic War. In terms of speed, maneuverability, flight range and armament, the Yak-9 surpassed all serial German fighters. The planes of the Yak family (Yak-1, Yak-3, Yak-7, Yak-9) flew such aces as Arseniy Vasilievich Vorozheykin (51 victories), Alexander Ivanovich Koldunov (46 victories), Alexei Mikhailovich Reshetov (35 wins), Alexey Konstantinovich Ryazanov (32 wins), etc.

During the war, several modifications of the Yak-9 were created. They differed from the main type mainly in armament and fuel supply. The fighters, designated Yak-9T, were equipped with a 37 mm cannon. In the summer of 1943, they underwent military trials on different fronts, near Kursk the Yak-9T successfully operated against German tanks. Reconnaissance versions of the machines were also serially built - Yak-9R and Yak-9UF, bomber - Yak-9B, Yak-9K with a 45 mm cannon, high-altitude interceptor Yak-9PD, training aircraft Yak-9V (export), communication aircraft - Yak-9 "Courier".

From mid-1944 to August 1945, the most advanced modification of the aircraft was produced under the designation Yak-9U, it was equipped with the M-107A engine. In total, the factories produced 16,769 Yak-9 aircraft of various modifications. Characteristics of the Yak-9: crew - ÿ person, power plant - | x VK-105PF with a capacity of 1240 liters. s., wing span - 9.74 m and its area - 17.15 m2, length - 8.5 m, height - 3.0 m, empty weight - 2350 kg, takeoff weight - 2875 kg, maximum speed - 598 km / h, range - 1000 km, rate of climb - 1020 m / min, practical ceiling - 10,400 m, armament - 1 ShVAK cannon of 20 mm caliber and 2 UBS machine guns of 12.7 mm caliber.

Yak-10

In January 1945, a Yak-10 aircraft for communications and local airlines was built with an M-11FM engine and a four-seater cabin. Flight tests of the aircraft were completed in June 1945, after which the aircraft was recommended for mass production. After the war, it was produced in the Yak-10, Yak-10V (export), Yak-10S (sanitary) and Yak-10G (hydro) variants.

Characteristics of the Yak-10: crew — 1 person, power plant — | x M-11FM with a capacity of 145 liters. s., wing span - 12.0 m and its area - 22.0 m?, length - 8.48 m, height - 3.8 m, empty weight - 792 kg, takeoff weight - 1150 kg, maximum speed - 202 km / h, range - 605 km, service ceiling - 3500 m, payload - 3 passengers or 250 kg

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cargo.

3. TWO-BEAM AND TWIN-BODY AIRCRAFT!

A two-beam aircraft was developed for the first time in the world by the Russian aviation designer A.A. Porokhovshikov. His two-seat reconnaissance aircraft "Bee-Kok" (No. 2, "Two-tail"), which underwent flight tests from August 15 to September 5, 1914, is the forerunner of all subsequent two-beam aircraft.

It should be said that although the Soviet aircraft designers in the prewar and war years, the two-beam scheme was well mastered and implemented in the projects of the I-12, K-7, Bloch, G-37, G-38, IP-3, LEM- 2 (OKA-33), MoV-2, PB-IS, SAM-13, TsAGI aircraft, EOI, "D" and La-VRD (the last two projects are described in the section "Jet aircraft"), however, this design scheme was not used popular with the leadership of the aviation industry and the command of the Red Army Air Force, therefore, on the eve and during the war, none of these aircraft was put into production. The aircraft of the two-beam scheme appeared in service with the Soviet Air Force only in 1982 - M-17 "Seagull" ("Stratosphere"), then in 1988 - M-17RM (M-55 "Geophysics").

A completely different picture was observed abroad, where twin-boom aircraft were in demand before and during the war. In the Netherlands, the Fokker C.1 aircraft was in service, in Germany - the Focke-Wulf Eu 189 and Blom and Voss Wu 138, in the USA - the Lockheed R-38 and Northrop R -61, twin-boom aircraft designs were developed in Italy and Japan.

The first twin-fuselage aircraft appeared in the USSR in 1932, when the Civil Air Fleet purchased six copies of the flying aircraft from Italy.

the S-55 catamaran boat, developed in 1922 by the Savoia Marchetti company. C-55 passenger planes flew mainly on the Far Eastern airlines Vladivostok-Petro-Pavlovsk until they were written off in the late 1930s. In 1934-1935. domestically designed twin-body aircraft appeared — the “sea cruiser” MK-I and the ASK amphibious seaplane, in 1936 — the KhAI-3 gliderlet, and in 1938 — the DB-LK bomber.

Several aircraft of this scheme were developed in Germany during the war - heavy glider tug He 1117, long-range reconnaissance aircraft ÿi 635, attack aircraft and bomber Me 1092, heavy fighter and high-speed bomber Me 609, etc. The Italians during During the war, the twin-body fighters Savoia-Marchetti 5M.92 and Caproni Ca.380 Sogzago were developed. By the end of the war, the long-range escort fighter P-82 Tut Miÿÿape of the North American company was undergoing flight tests in the United States. A small batch of 20 R-82Vs was made for the US Air Force after the end of the war.

ASK

The twin-fuselage amphibious seaplane ASK (“Amphibian of the Northern Territory”) was designed and built in 1935 in Leningrad by aircraft designers V.Ya. Krylov, I.M. Zharnylsky, G.I. Bakshaev and L.S. Wildgrube. ASK was equipped with the M-22 engine, the vertical tail was carried out with three tails. Each of the two boats housed a closed passenger cabin for three people. A semi-open cockpit with a front canopy was located on the center section. In the spring of 1935, flight tests of the machine began with takeoff and landing on water and on land. In winter, the car was installed on a ski chassis and took off from the ice. After testing, the car was handed over to the Glavsevmorput and operated on local airlines. The car was not serially built.

Characteristics of ASC: crew — 1 person, power plant — | x M-22 with a capacity of 480 liters. s., wingspan - 20.8 m and its area - 66.4 mg, aircraft length - 13.0 m, height - 5.8 m, weight

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empty — 2450 kg, takeoff weight — 3450 kg, maximum speed — 215 km/h, service ceiling — 4100 m, range — 700 km.

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"Flea"

By the summer of 1942, under the leadership of A.S. Moskalev, a project was developed for the flying tankette “Blokha” (“LT”), intended for the destruction of armored vehicles and manpower of the enemy, as well as the destruction of ground obstacles, barriers and defensive fortifications. The “Blokha” was a single-seat two-boom aircraft 6.8 long and with a wingspan of 5.57 m; the M-11 engine with a pusher propeller was used as a power plant. The pilot was located in an armored cockpit. The armament of the aircraft consisted of two ShVAK cannons, two ShKAS machine guns, four or six RS-132 rockets and 400 kg bombs. The maximum flight weight of the flying tankette was 1128 kg.

It was assumed that one of the main modes of aircraft flight during combat operations should be a low-level flight above the ground at a height of 4-5 m. enemy fire. The small size of the "Flea" allowed her to start from ordinary roads, fly over them at low altitude, covertly advancing to the place of a surprise attack on columns of armored vehicles and enemy manpower. "Flea", in addition, could carry out attacks on ground targets in the usual way for aircraft - - from a dive from a height of 1000-1200 m. However, after consideration, the project was rejected.

I-12 (ANT-23)

In the middle of 1930, technical requirements were formulated for a heavy fighter capable of combating an air enemy at long ranges and at altitudes up to 5000 m. buckshot.

Under these requirements, a single-seat fighter I-12 (ANT-23) was developed at TsAGI, the work was carried out by the team of V.N. Chernysheva from P.O. Sukhoi. A feature of the aircraft was that the developers, having based the design of the aircraft on a two-beam scheme, were able to use two 76-mm dynamo-active guns by L.V. Kurchevsky to be placed in beams with a diameter of 170 mm, at the rear ends of which the tail unit was attached.

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Work on the I-12 began in December 1930. It was decided to use two YuOpiter-UI engines as a power plant, installed in tandem (one pulling, the other pushing) in a short fuselage, the cockpit and fuel tank were located between the front and rear engines. At the beginning of the summer of 1931, a prototype aircraft was ready. It was built from duralumin, the wing and tail plating was corrugated.

When designing, the young designers did not take into account one thing, which was immediately pointed out by test pilot I.F. Kozlov. The point was that a pilot attempting to leave the cockpit in an emergency would be at serious risk of being hit by the rear propeller. Despite this potential danger, I.F. Kozlov agreed to fly on the I-12. The first flight took place on August 29, 1931; in further tests, the aircraft flew quite well, but its characteristics turned out to be lower than the calculated ones. Among the main reasons was that the rear engine did not produce the expected power; and the air resistance from the non-retractable landing gear and corrugated tail skin was too high. It turned out that the double vertical tail, which was outside the area of blowing propellers, is inefficient on taxiing and run. Therefore, in the process of testing, a single-keel empennage was installed, the necessary rigidity of which was provided by struts.

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By autumn, the I-12 was prepared for testing cannon weapons on it. The first ground firing took place on November 11 at the airfield of the Air Force Research Institute. Flight firing was planned for March next year. March 21, 1931 I.F. Kozlov flew to the Kuntsevsky test site to test the agro-industrial complex in the air. Each gun was equipped with two shells: one was in the barrel, the second was in the store. At an altitude of 1000 m, the pilot fired a shot from the left gun. At the same time, the diffuser ruptured, the gun fairings were torn off, and the stabilizer control wiring was damaged. =

I.F. Kozlov, unable to leave the cockpit of the aircraft with a parachute, since there was a great risk of falling under the rear propeller, with great difficulty managed to control the damaged aircraft and managed to land it. During landing, the tail boom broke, but the experienced fighter was saved. For saving the aircraft, the pilot was awarded the Order of the Red

Stars. The gun was returned to the developers, who determined the cause of the accident and fixed the defect. On this, work on the I-12 was completed, although the second prototype of the aircraft was already under construction.

In connection with the accident, a special meeting was held with M.N. Tukhachevsky, on which it was decided to modify the guns - to increase the thickness and strengthen the diffuser walls with additional stiffeners. I-12 was repaired and made a number of flights. In total, until the last launch, which took place on September 28, 1932, the plane took off 21 times. Further, it was decided to stop flying, as the number of improvements was constantly growing, and the obtained characteristics were not satisfactory.

The second prototype I-12bis was under construction. The aircraft, made according to the same scheme, had modified geometric parameters (length - 7.5 m, wingspan - 15.6 m, wing area - 33 m?) and had improved aerodynamics. The construction of the I-12bis began in the summer of 1931, but was delayed due to unsatisfactory flight tests of the first machine. In 1933, the regional organization of the All-Union Leninist Young Communist League decided to take patronage over the aircraft, in connection with which the I-12bis received the name “Bauman Komsomolets”. Komsomol members of TsAGI undertook to work at the assembly for 60 hours in their free time. Although the car was almost 85% complete, the work on it was finished.

Characteristics of the I-12 (ANT-23): crew - 1 person, power plant - 2 x "Jupiter-UI" with a capacity of 525 hp each. s., wing span - 15.6 m and its area - 30.0 mg, aircraft length - 9.5 m, takeoff weight - 2400 kg, maximum speed - 300 km/h, armament - 2 APK- 100 caliber 76 mm.

G-37

In 1934 at the Experimental Institute P.I. Grokhovsky, a team of designers led by Vladimir Fedorovich Rentel developed the G-37 "ULK" ("universal flying wing") aircraft, made according to a two-beam scheme. To speed up the construction, the wing and old M-17 engines from the decommissioned passenger ANT-9 were used. The G-37 aircraft, intended for the transport of airborne troops, had fairings in the form of "trousers" on non-removable racks

G-37

si and a drop-shaped drop-shaped landing cabin suspended under the fuselage.

It was built in the winter of 1933/34 in Leningrad, flight tests of the machine were carried out by V.P. Chkalov from May 7 to June 1, 1934. The machine showed good stability and controllability in all modes and, most importantly, the absence of vibrations, which are so characteristic of two-beam structures. Having finished the tests, on June 12, 1934, V.P. Chkalov overtook the G-37 to Moscow at the Central Airfield named after

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Frunze (former Khodynka field), and with a record time of that time - 2 hours 15 minutes. Here the plane was examined by a commission headed by G.K. Ordzhonikidze, M.N. Tukhachevsky and Ya.I. Alksnis. The G-37 was delighted, especially the commission was impressed by its high flight speed, since the R-6 (KR-6, cruiser) A.N. Tupolev developed a lower speed.

Tests of the G-37 continued. The payload was transported in a universal removable cabin, which included 10 passengers or 12 paratroopers with weapons, from 5 to 10 wounded soldiers or four patients on a stretcher (with an orderly). It also provided for the transportation of various cargoes with a total weight of up to | t (in overload). In an emergency or on a special assignment, it was possible to drop the cabin itself on a parachute with a diameter of 40 m.

By the beginning of 1935, new M-17 engines were installed on the aircraft, ordered by Ya.I. Alksnis. The maximum speed of the aircraft with the new engines has increased to 375 km/h. In the spring of 1935, tests with a landing cabin were continued. It was repeatedly abandoned in the air by paratroopers, jumping out through the aft hatch. For the combat use of the aircraft, a machine-gun defensive armament was provided.

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nie. In the open cockpit of the navigator, it was possible to install a pair of DA machine guns on the turret. The crew of the G-37 in this version could consist of 2 to 3 people, depending on the purpose.

A more advanced version of the G-37A aircraft with M-34N engines was developed, its model was blown in the aerodynamic tube of the N.E. Zhukovsky. Experiments with the model have shown that the maximum speed of the G-37A can be about 400 km/h. Flight tests of the G-37 continued until November 1936, when the institute P.I. Grokhovsky was disbanded, soon all work on the G-37 ceased.

The idea implemented by P.I. Grokhovsky in the G-37 aircraft, after almost ten years, was in demand abroad. Similar projects of transport aircraft with suspended cargo cabins were developed during the war in the United States (Fairchild XC-120 Opening) and in Germany (Fieseler Ei 333).

Characteristics of the G-37: crew - 3 people, power plant - 2 x M-17 with a capacity of 680 hp each. s., wingspan - 23.7 m and its area 84.0 m?, aircraft length - 15.2 m, height - 4.52 m, empty weight - 3075 kg, take-off weight - 5950 kg, maximum speed - 285 km/h, service ceiling - 8050 m, range - 1700 km, payload - 10 passengers.

G-38

Multi-purpose aircraft G-38 (LK-2, “light cruiser”), the development of which, on the instructions of the Air Force command, began in the summer of 1934 at the Experimental Institute of P.I. Grokhovsky, was also carried out according to a two-beam scheme. The aircraft was equipped with two Gnome-Ron K-14 engines, located in the bows of the beams, had very powerful armament of two ShVAK cannons and two ShKAS machine guns for firing forward, a ShKAS turret for the navigator, a twin ShKAS for the gunner-radio operator for firing into the rear hemisphere and two defensive grenade launchers AG-TB caliber 40.8 mm. The "Light Cruiser" could carry bombs suspended under the cockpit. Work on the aircraft was carried out under the personal supervision of Ya.I. Alksnis and Deputy Commissar of Defense M.N. Tukhachevsky. P.A. supervised the design. Evensen, who previously worked at the R.L. Bartini above passenger

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aircraft "Stal-7" as the head of the general design group. The tests carried out in November 1934 on the G-38 model in the TsAGI wind tunnel showed that the aircraft's maximum speed could be increased to 550 km/h. In December 1934, the preliminary design of the Light Cruiser was completed. The G-38 was superior in all respects to the "cruiser" A.N. That-

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field, tested in 1933-1935 - MI-3 (ANT-21), MI-ZD (ANT-21bis) and DIP (ANT-29).

M.N. Tukhachevsky, having familiarized himself with the project, called the G-38 “the most important object of aviation technology for the rearmament of the Red Army.” He demanded that the work be accelerated, emphasizing the state importance of creating such an aircraft, and promised that, if the flight tests were successful, the creators of the “light cruiser” would be presented with government awards. Two months later, the full-scale model of the “light cruiser” was already assembled in the hangar on Khodynka. We got acquainted with the layout of the people's commissar of heavy industry G.K. Ordzhonikidze, M.N. Tukhachevsky, Ya.I. Alksnis, other military leaders, as well as test pilots, among whom was V.P. Chkalov. Having familiarized himself with the machine in detail, V.P. Chkalov told P.I. Grokhovsky: “Great model. Bring it to life as soon as possible. I'm making my first flight."

The prototype aircraft was almost completed by the end of 1936, but due to the dissolution of the Experimental Institute, all work on the G-38 was stopped. As mentioned above, in 1937 Marshal M.N. Tukhachevsky, was repressed and in 1938 was shot by Ya.I. Alksnis, on whose instructions the work of the Experimental Institute was carried out. Therefore, the repressions also affected P.I. Grokhovsky and his collaborators. Among these employees was P.A. Ivensen, who was arrested in April 1938. He was released in 1940, but he was forbidden to settle in large cities. In 1956, the Military Collegium of the Supreme Court of the USSR completely rehabilitated P.A. Ivensen, and he returned to design activities. In the 60s and 70s. participated in the design of manned

space complexes.

So sadly ended the history of the creation of a two-beam “light cruiser”, which, having a lower power plant, was at least as good as a heavy destroyer in terms of its flight characteristics and firepower.

the body of the Luftwaffe BE 110, issued during the war years by the Messerschmitt company in the amount of more than 6000 copies.

At the same time that work was underway on the G-38, the "light cruiser" of the two-beam scheme was being developed in Holland at the Fokker company. The aircraft, designated S.I by the company, was supposed to be produced in the variants of a heavy fighter, a short-range reconnaissance spotter, a long-range photo reconnaissance aircraft, and a light bomber (in two subspecies - for bombing from level flight and from a dive). The construction of a prototype began in the summer of 1935, in November a full-size model of the aircraft was exhibited at the Paris Air Show simply under the name of the company - Fokker. The C.1 flew for the first time on March 16, 1937. At the end of October 1937, the Dutch Air Force ordered 36 C.1s with delivery beginning in the fall of 1938, but the Dutch military did not receive the first aircraft until April 1939.

In November 1939, the Fokker company began testing a new two-beam fighter O.ÿÿÿ, which developed a higher speed than the C.1. However, the work on O.ÿÿÿ did not progress further than the prototype, since it was destroyed in 1940 during the capture of Holland by the Germans.

The new two-beam aircraft that appeared in Holland aroused interest in them in other countries. On March 30, 1940, the Swedes issued an order to Fokker for 18 C.1 machines, and a month later for another 77 machines. The Danes acquired a license to build 12 aircraft, and the war found the Danish aircraft industry at the stage of preparation for their mass production. Planes C.1 for Hungary were also going to be manufactured by Manfred Weiss in Budapest. In addition to their own production, the Hungarian Air Force wanted to buy a batch of "light cruisers" already assembled, but negotiations broke down after the German attack on Holland.

On May 10, 1940, the Dutch Air Force had in service 26 OLA aircraft with British Mercury engines and 5 O.1B aircraft with American Touch Mazr Lipiog engines. Around four in the morning on May 10, German bombers unexpectedly attacked the Waalhaven airfield, where

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one of the squadrons of "light cruisers" was located. Only three OA managed to take off, but they adequately stood up for themselves - five downed He 111 bombers and one damaged He 111.

aircraft with troops escorted by bombers, they were met by a trio of S.1A fighters and shot down six enemy planes, among which were one transport aircraft ÿi 52 / 3t with troops, two B {.109 fighters, He 111 and Oo 215 bombers.

When Holland capitulated, the Germans got seven or eight cars in good condition or with minor damage, four more were found in a warehouse in a mothballed form. Subsequently, these machines served in one of the Luftwaffe flight schools in Austria.

In Germany, a year and a half after the termination of work on the G-38 in the Soviet Union, in July 1938, the aircraft of the two-beam scheme Ru 189 ÿÿi ("Filin"), developed by the German company Focke-Wulf, made its first flight. . The Ru 189 aircraft entered service with the Luftwaffe in the summer of 1940, the total number of various modifications of the Ru 189 built was 864, they fought in World War II, including against Soviet aviation (in our troops they had the nickname "Rama ").

Since 1937, the Luftwaffe was armed with Blom and Voss Vu 138 seaplanes, made according to a two-beam scheme. In total, before the end of production in 1943, 279 copies were produced. In April 1940 they supplied the German troops that landed in Norway, from December 1940 they patrolled the waters of the Bay of Biscay and the North Atlantic, and from June 1941 they operated in the zone of the Baltic and Black Seas.

In 1939-1940. The Arado firm worked on the project of the Ag 340 double-beam bomber, in August 1941 the Gotha So 242 airborne glider entered service with the Luftwaffe. : 4-engine bomber Ag E.500 (1942), jet attack aircraft and dive bomber "Blom and Foss" Vu R.196 (1943), jet fighter BMW bÿtaÿShareg IP (1944), fighter "Focke-Wulf" Yem R.UP Eshgeg with turbojet engine and its variant Ru Tareg Rgoek with PD VMU 803 (1944), jet fighter "Focke-Wulf" Em R.UIP (Em 281) (1944), 4-engine bomber E \ 261 (R.0310225) (1944).

The two-beam fighter of the American firm "Lockheed" P-38 Iirinpipr ("Lightning") took to the air for the first time on January 27

Since 1939, during World War II, it was in service with the US Air Force. A total of 10,037 R-38s were built, they were used in Europe against the Germans and Italians, and in the Pacific region against the Japanese. In addition to the US Air Force, it was also in service with the Air Forces of Australia, France, England, Portugal, etc.

In 1939, Ve! started the development of a two-beam fighter Moggor. The night fighter Mogigor P-61 ÿÿÿsk Mldou ("Black Widow") was adopted by the US Air Force in 1942, the total number of built machines was 742 copies.

In September 1943, for the first time, a two-boom aircraft of the De Havilland company, O.N.100 Vampire, took off for the first time. It became the first British fighter with a turbojet engine and entered service with the RAF in 1946.

During the war, the Italians developed the Savoy-Marchetti 5M.91 twin-beam fighter, the Japanese developed the Manshu Ki-98 attack aircraft, the Mitsubishi Type 0, Mitsubishi JAM and Gachikawa Ki-98 fighters. 94-1.

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Since 1943, the Swedish firm ZAAV has been producing a two-beam fighter in the J-21A and A-21A-3 versions, equipped with a German OV 6058 engine, the total number of aircraft built was more than 400 copies.

Characteristics of the G-38: crew - 3 people, power plant - 2 x "Gnome-Ron" K-14 with a capacity of 800 hp each. s., wingspan - 13.4 m and its area 32.0 m", length - 8.8 m, height - 2.9 m, take-off weight - 4000 kg, maximum speed - 550 km/h, armament — 2 ShVAK guns of 20 mm caliber, 6 ShKAS machine guns of 7.62 mm caliber, 2 AG-TB grenade launchers of 40.8 mm caliber.

Characteristics of C.IA (for comparison): crew - 3 people, power plant - 2 x "Bristol Mercury YSHI" with a capacity of 330 hp each. s., wing span - 17.2 m and its area 38.3 m ", height - 3.4 m, empty weight - 3323 kg, take-off weight - 4790 kg, maximum speed - 475 km / h, armament - 2 guns "Madsen" caliber 20 mm, 3 machine guns caliber 7.62 mm and 400 kg of bombs.

Characteristics of the R-38G (for comparison): crew - 1 person, power plant - 2 x Allison U-17101-49/53 with a capacity of 1250 hp each. s., wing span - 15.86 m and its area 30.42 m?, height - 2.99 m, empty weight - 6169 kg, take-off

weight — 9070 kg, maximum speed — 558 km/h, armament — 1 Hispano cannon of 20 mm caliber, 4 Browning machine guns of 12.7 mm caliber and 907 kg of bombs.

IP-3

In the development of the I-12 aircraft in 1931 under the leadership of D.P. Grigorovich, a project was developed for a high-altitude version of a cannon fighter, designated IP-2 (DG-54). It was equipped with a Hispano-Suiza 12 hbg engine with 760 hp. With. and two APK-4 guns of 76 mm caliber. However, the prototype IP-2 was never built.

Further work on the cannon fighter was carried out in Leningrad at the Department of Military Inventions (UVI), the project was taken up by employees of the UVI Zaslavsky and Bas-Dubov. They designed a two-boom aircraft SS (high-speed aircraft), later renamed IP-3. According to the main geometric parameters (length - 9.46 m, wingspan - 14.0 m), it was close to the I-12, but had a closed cockpit and retractable landing gear, which contributed to obtaining high performance. The designers expected to reach a maximum speed of 450 km / h at an altitude of 7000 m. The construction of the prototype began, but soon all work on the IP-3 was stopped.

K-7

At the beginning of 1932, under the leadership of K.A. Kalinin, the project of the K-7 multi-purpose aircraft of a two-beam scheme was completed, which was intended for both military and civilian use.

In the military version, the giant K-7 aircraft, the power plant of which consisted of 7 engines, was a “flying fortress” armed with 8 cannons of 20 mm caliber and 8 machine guns of 7.62 mm caliber and capable of carrying up to 10 tons of bomb load in the wing bomb bays. As a military transport aircraft, it could carry 112 paratroopers, and between the undercarriage bogies it could carry an 8.4-ton tank or cargo dropped by parachute.

In the civilian version, the K-7 could carry 128 passengers over a distance of up to 5,000 km, and in the luxury version,

It was necessary to equip 64 sleeping places for passengers, a cabin, a buffet, a kitchen and a radio room. For comparison, it should be said that the German giant aircraft of that time took on board

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fewer passengers (Dornier Po-X - 100 people, and Junkers C-38 - 40 people).

In August 1933, the first prototype aircraft began flight tests. After performing flights in a straight line to a height of up to 5 m, the aircraft design was finalized. The first flight of an experimental machine took place on August 21, 1933, this is how test pilot M.A. commented on this flight. Snegirev: “The car in the air obeyed the rudders well. It was easy to manage. I didn't even believe it. Slightly pull the steering wheel - and the machine immediately responds! Further flights showed good flight qualities of the aircraft. However, on November 21, during tests to measure the maximum speed of the car, an accident occurred, the plane crashed and caught fire, killing 15 crew members. |

After investigation and clarification of the causes of the plane crash, the team of K.A. Kalinin was instructed to produce two new prototypes, which were supposed to be transferred to flight tests at the beginning of 1935. However, soon all work on the K-7 was stopped, since the leadership of the aviation industry considered that A.N. Tupolev. His plane ANT-20 "Maxim Gorky" took off for the first time on June 17, 1934. But as mentioned above, the fate of the plane "Maxim Gorky" turned out to be tragic - it crashed in a plane crash on May 18, 1935.

Characteristics of K-7: power plant - 7 x M-34F with a power of 750 liters. s., wing span - 53.0 m and its area - 454.0 m?, length - 28.0 m, empty weight - 21,000 kg, takeoff weight - 40,000 kg, maximum speed - 234 km /h, range - 1000 km, practical ceiling - 5500 m, armament - 8 cannons of 20 mm caliber, 8 ShKAS machine guns of 7.62 mm caliber and 10,000 kg of bombs.

LEM-2 (OKA-33)

In the 30s. the idea of creating a glider (glider, motor glider) was popular. This term refers to a large glider powered by a relatively small engine.

ness. It was assumed that an unloaded glider should take off on its own engine, while a loaded glider should take off with the help of a towing aircraft. It was believed that in off-road conditions, the transportation of people and goods by glider would be more economical than by car. Conducted in those years, numerous experiments towing gliders and entire glider trains (up to nine gliders in tow from one aircraft) gave confidence in the possibility of carrying out cargo and passenger transportation with the help of gliderlets.

In January 1934, under the leadership of Oleg Konstantinovich Antonov, at that time the chief designer of the Osoaviakhim glider plant, the development of the glider LEM-2 (OKA-33) of a two-beam scheme began. The test vehicle took to the air on April 20, 1937. As a result of the tests, the vehicle's ability to take off independently, good stability and controllability were revealed. It was possible to take off independently with the crew and fuel, but without load. The results of summer tests testified that an apparatus with a commercial load of 1000 kg could independently take off with an engine with a power of 180-220 hp. With. However, things did not go further than testing an experimental machine.

Characteristics of LEM-2 (OKA-33): crew - 1 person, power plant - | x M-11 with a capacity of 100 liters. s., wing span - 27.6 m and its area - 81.4 m ”, length - 10.6 m, empty weight - 1640 kg, take-off weight - 2920 kg, maximum speed - 117 km / h, practical ceiling - 1500 m

MK-1

In the early 1930s The Navy has formulated requirements for a “flying cruiser” capable of delivering midget submarines or self-driving torpedo boats to a combat area.

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Work on these devices was carried out at the Ostekhbyuro (Special Technical Bureau for Military Inventions for Special Purposes) in Leningrad, which was led by the talented inventor Vladimir Ivanovich Bekauri. From 1921 to 1929, the Ostekhbyuro included three main scientific and technical departments that were engaged in the development of marine, aircraft and radio telemechanical weapons for the army and navy. In 1923-1925. Ostekhbyuro created the Vozotrans system,

which made it possible to deliver troops, artillery pieces, motor vehicles, tankettes, and radio stations to their destination with the help of aviation. On May 5, 1932, at a meeting of the Revolutionary Military Council of the USSR, it was noted that the activities of the Ostekhburo significantly strengthen the defense capability of the USSR. The initiative of the Ostekhbyuro to issue an order to TsAGI for the construction of the first Soviet heavy bombers (as bombers were called at that time) TB-1, TB-3, TB-4 was especially noted. These works were financed through Ostekhbyuro. On April 6, 1933, six Ostekhbyuro specialists were awarded orders, including the Order of Lenin - V.I. Bekauri.

In accordance with the requirements of the Ostekhbyuro for a "flying cruiser", under the leadership of A.N. Tupolev, a long-range “sea cruiser” MK-I (ANT-22) with a long flight duration was developed.

MK-I was a catamaran flying boat, which had three twins of M-34R engines installed on the wing, in each twin one engine turned the pulling screw, and the other - the pushing screw. In each of the hulls of the boat there were two rifle installations with twin DA-2a machine guns of 7.62 mm caliber (bow and tail). Behind the wing, each hull had an Oerlikon cannon for firing into the rear hemisphere.

The experimental machine built at the end of 1933 was dismantled and transported by rail to Sevastopol, where it was reassembled. Factory tests of the MK-1 began on August 8, 1934 and continued until May 8, 1935. During the tests, the maximum flight speed near the water surface was 233 km/h, at an altitude of 3000 m - 207 km/h. The aircraft reached the practical ceiling of 3500 m in 57 minutes. From July 27 to August 15, 1935, the MK-I aircraft passed a full cycle of state tests. When flying with full armament, including 6,000 kg of bombs, the aircraft performance decreased: the maximum speed near the water surface was 205 km/h, cruising speed was 180 km/h, and the service ceiling was 2250 m. install more powerful M-34RN or M-34FRN engines.

By this time, the Ostekhbyuro had developed a project for an aero-underwater self-propelled projectile (APSS). It was assumed that the APSS will be delivered by aircraft MK- | to the area

finding a target, where after launching, depending on the nature of the task, it could work in two modes. In the first (unmanned) mode, the device was controlled remotely from the carrier aircraft and attacked the target like a powerful torpedo. In the second mode, the craft was controlled by its own pilot and acted like an ordinary submarine, attacking the target with a torpedo. After the attack was carried out, the APSS returned to its carrier aircraft and was delivered to its base. In total, two APSSs were built at the Sudomekh plant in Leningrad, one (1935) was riveted, and the second (1936) was welded. However, problems with the APSS remote control equipment forced the fleet to abandon this device.

In parallel with the APSS, Ostekhbyuro was working on the creation of a heavier air-powered submarine called APL. The concept of the use of nuclear submarines was the same as that of the APSS, that is, delivery on a flying boat-carrier to a given area, performing the assigned task in autonomous navigation under the control of the crew, and returning to its carrier. By the summer of 1935, the first copy of the nuclear submarine was READY.

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In August 1935, the nuclear submarine passed factory tests in the Baltic, and in November it was transported to the Ostekhbyuro base near Sevastopol for naval tests. In November, the order of the People's Commissar of Defense was issued, which ordered the construction of ten nuclear submarines, of which five were to be built in 1936. However, based on the results of nuclear submarine tests in June 1936, it was decided to start production of more advanced devices under the designation “Pygmy”, a prototype of which was built in the same year in Leningrad. But the tests of the Pygmy, whose weight reached 18 tons, revealed a number of shortcomings that prevented the boat from being accepted into the fleet.

In addition, by that time it was not possible to increase the carrying capacity of the carrier aircraft to the required level, although the MK-1 on December 8, 1936 set a world record for carrying capacity for seaplanes, lifting 10,000 kg of cargo to a height of 1942 m, and later a load of 13,000 kg, although this achievement was not recorded as a record. Further work on MK-I was stopped, since in 1937 V.I. Bekauri was arrested on charges of spying for Germany, and on February 8, 1938, he was shot, and the Ostekhburo was disbanded. In

On June 9, 1956, the Military Collegium of the Supreme Court of the USSR rehabilitated V.I. Bekauri.

Characteristics of the MK-1: power plant - 6 x M-34R with a capacity of 830 hp each. s., wing span - 51.6 and its area 304.5 m2, length - 24.1 m, height - 6.36 m, empty weight - 22,340 kg, takeoff weight - 33,560 kg, maximum speed - 223 km / h, range - 1330 km, practical ceiling - 3500 m.

MoV-2 (BSh-MV)

In 1940, under the leadership of A.A. Arkhangelsky, G.M. Mozharovsky and I.V. Venevidov, the development of the armored attack aircraft BSh-MV began. The basis of the offensive armament of the attack aircraft was a mobile gunnery mount (PSPU). BSh-MV was a single-seat two-beam monoplane with a reverse gull wing and an AM-38 engine that drove the pusher propeller.

Behind the cockpit, a PSPU was installed with two 23 mm Taubin cannons deflected up to 30° and four ShKAS machine guns of 7.62 mm caliber. The PSPU barrels were controlled by an electric motor, the sight was synchronously connected with small arms and cannon armament. The maximum bomb load was 500 kg; the wing consoles provided for the suspension of six RS-82 rockets.

According to G.M. Mozharovsky and I.V. Venevidov, who, in fact, were experts in the development of weapons systems for combat aircraft, the use of PSPU on an attack aircraft should have significantly increased the effectiveness of the combat use of an attack aircraft by providing a long-term fire impact on the target when attacking the enemy from level flight. The essence of the work of the PSPU was as follows. The pilot, before attacking a ground target, maintained a constant altitude and a constant flight speed, after which he took aim and opened fire, further holding the PSPU barrels on the target during the entire attack was carried out by automation.

The order for the construction of the BSh-MV attack aircraft, which was assigned the serial designation MoV-2, was signed | April 1941 It was planned to present the first prototype

cars for state tests by October 15, 1941, and the second sample - by December 1. The first BSh-MV vehicle was armed with a PSPU with four ShVAK cannons and four ShKAS machine guns, four ShKAS wing machine guns and 500–600 kg of bombs. The armament of the second vehicle provided for two options: the first was the PSPU (two 23 mm guns and four

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ShKAS machine gun) and two 12.7 mm wing machine guns, the second - PSPU (two 37 mm caliber guns) and four ShKAS in the wing.

By the beginning of the war, they had only managed to start building the first machine, but soon all work was stopped.

Nevertheless, G.M. Mozharovsky and I.V. Venevidov experimented a lot with the installation of mobile gunnery and cannon systems. In March-April 1941, the Yak-2 with KABB-MV (the combined artillery-bomber battery of Mozharovsky and Venevidov) was tested at the Air Force Research Institute. The same work on the installation of KABB-MV was carried out on the assault version of the SB (SB-Sh) aircraft. In 1942, similar work was carried out with the Pe-2, the chief designer of plant No. 262 A.A. was involved in this work. Yengibaryan, who modified the KABB-MV, received the AKAB (combined automatic artillery battery) as a result.

In the spring of 1944, AKAB (2 ShVAK cannons and 2 UBK machine guns) were introduced on Lend-Lease A-20S aircraft; they equipped six aircraft from the 27th Guards Long-Range Bomber Aviation Regiment. AKAB made it possible to fire at ground targets from horizontal flight, and the duration of the fire effect in one run significantly exceeded this indicator for the case of shooting while diving or from horizontal flight. In total, the A-20S had six 20-mm cannons and the same number of heavy machine guns in the nose and ventral batteries, as well as two turrets.

In combat conditions, AKAB was tested during a raid on the Baranovichi airfield, the largest German air base in occupied Belarus. The group, which started on the night of June 28, 1944 from the Ivan-gorod airfield, also included an aircraft equipped with AKAB, with the task of blocking the duty link of German fighters on the ground and preventing them from taking off. After the raid, Air Marshal A.E. Golovanov gave the go-ahead to the idea by signing the test report with re

resolution: “AKAB, as a new type of aviation weapon, can be used in the ADD to arm A-200 aircraft.”

PB-IS

By the spring of 1941, L.P. Kurbala, in 1931-1934. who worked under the direction of D.P. Grigorovich as part of the MAI student group on the creation of the Stal-MAI aircraft, in 1939-1940. engaged in fine-tuning, modernization and introduction of the BB-22 aircraft into the series, proposed a project for a dive bomber-escort fighter. The two-beam aircraft, equipped with two M-71 engines, had a spaced tail, the crew (pilot, navigator and radio operator) was located in the fuselage, which had a bomb bay. Powerful weapons were installed on the aircraft.

After consideration by the Air Force Research Institute, the project was approved and recommended for construction in 1941, a prototype, but with the outbreak of war, all work on the aircraft was stopped.

Characteristics of PB-IS: crew - 3 people, power plant - 2 x M-71 with a capacity of 2000 liters each. s., wing span - 17.2 m, its area - 37.0 m?, length - 14.4 m, take-off weight - 10,500 kg, maximum speed - 660 km/h, range - 2500 km, rate of climb - 770 m / min, practical ceiling - 11,000 m, armament - 2 MP-6 cannons of 23 mm caliber and 6 ShKAS machine guns of 7.62 mm caliber and 6 PCs of 82 mm caliber.

CAM-13

Aircraft CAM-13 ("mosquito fighter") A.S. Moskaleva was a fighter with two engines, made according to a two-beam scheme with one keel on the stabilizer.

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The engines in the fuselage were located in tandem, between them was the cockpit. The rear propeller had a locking device that provided the pilot with the opportunity to leave the aircraft in case of an emergency. The calculated maximum speed of the aircraft was 680 km/h at an altitude of 5000 m, which significantly exceeded the corresponding

the characteristics of the aircraft of the same design - the Dutch ALA and O.XXIP, the German Em 189 and the American P38.

The prototype of the aircraft was built by the end of 1939 and was blown in the wind tunnel T-101 of TsAGI, after which in the spring of 1940 the aircraft was brought to factory tests. During flight tests, the aircraft showed good stability and controllability, even with fixed landing gear it reached a speed of 560 km/h. The complexity of fine-tuning the nose landing gear, which was poorly pulled into the fuselage niche, did not allow obtaining the calculated maximum speed, the actually achieved value was 607 km/h, which, with a total power plant power of 440 hp. With. was a great achievement. The tests were nearing completion, but by order of the Deputy Head of the NKAP for experimental aircraft construction A.S. Yakovlev, the tests were stopped, and the aircraft was re-sent to TsAGI to test the wing and tail of the aircraft for flutter, although there was already a positive conclusion from TsAGI on the flutter of the aircraft. TsAGI again tested the machine for flutter, the tests showed, as before, that the aircraft can fly at speeds up to 800 km/h without vibration. However, the war began, and all work on SAM-13 was stopped, and OKB A.S. Moskalev was evacuated to Siberia, where he was entrusted with the development of many local landing cabins, gliders, transport and ambulance aircraft.

Characteristics of SAM-13: crew - 1 person, power plant - 2 x "Renault-6" with a capacity of 220 hp each. s., wing span - 6.7 m, its area - 9.0 m?, length - 7.4 m, empty weight - 754 kg, take-off weight - 1183 kg, maximum speed - 680 km/h, range - 850 km, practical ceiling - 10,000 m, armament - 2 ShKAS machine guns of 7.62 mm caliber.

Characteristics O.ÿÿÿ (for comparison): crew - | man, power plant — 2 x Maeg Bar a I-5K with a capacity of 540 hp each. s., wing span - 11.5 m and its area - 18.5 m?, length - 10.2 m, height - 3.8 m, empty weight - 2180 kg, takeoff weight - 2950 kg, maximum speed - 540 km/h, range — 840 km, service ceiling — 9000 m, armament — 2 machine guns of 13 mm caliber and 2 machine guns of M-36 caliber of 7.69 mm.

TsAGI aircraft

In 1940-1941. at TsAGI under the leadership of I.V. Ostoslavsky, appointed in 1943 as deputy head of TsAGI for aerodynamics, a project was developed for a high-speed two-beam aircraft. The aircraft was equipped with a laminarized wing, which had a minimum aerodynamic resistance in flight, and an engine located behind the flight deck with a pusher propeller. The construction of the first prototype was completed after the start of the war in evacuation, in conditions of a shortage of engines, the construction of the machine could only be completed in the glider version. The glider had a wingspan of 14.9 m, a length of 10.38 m and a height of 3.69 m. G.P. Svishchev, later academician, head of TsAGI, and G.S. Byushgens, later academician, deputy head of TsAGI. During flight tests, the airframe was damaged, and soon all work on it was stopped.

EOI

As mentioned above, by September 1939, under the leadership of V.N. Belyaev, a project was developed for a single-seat cannon fighter EI. After EI was not accepted for mass production, V.N. Belyaev, taking into account critical comments, redesigned it into a two-beam version with an M-105PTK engine and a pusher propeller. This version of the machine received the designation EOI

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(an experimental single-engine fighter), in terms of its characteristics, it should have practically corresponded to its predecessor. As weapons, it was supposed to put two 23-mm cannons and one machine gun.

After reviewing the project, it was decided to build two experimental machines with the readiness of the second machine by December 1, 1940. However, due to overloaded production facilities, the construction of the first machine was delayed until July 1941. In the conditions of the outbreak of war, a decision was made to stop works on EOI. In October, during the evacuation of the plant from Moscow, the aircraft, which was 90% ready, and all its technical documentation were destroyed.

Another option for EOI was a single-seat PBI (dive-bomber-fighter). This double beam machine

It had a takeoff weight of 2850 kg and a wingspan of 12.2 m, was equipped with an M-107 engine with a pusher propeller, and brake grids were placed on it to ensure exit from a dive. The armament consisted of one cannon, one machine gun, 500 kg of bombs and RS-132 rockets. A full-size model of the aircraft was made, but the project was not accepted for implementation.

Characteristics of EOI: crew - 1 person, power plant - | x M-105PTK with a capacity of 1000 liters. s., wingspan - 11.4 m and its area - 19.0 m?, take-off weight - 2640 kg, maximum speed - 712 km/h, armament - 2 guns of caliber 23 mm and | machine gun ShKAS caliber 7.62 mm.

Characteristics of PBI: crew - | man, power plant - I x M-107, wingspan --- 12.2 m, take-off weight - 2850 kg, armament - 1 Taubin--Baburin cannon, 1 ShKAS machine gun of 7.62 mm caliber and 500 kg of bombs.

4. TAILLESS AIRCRAFT AND FLYING WINGS

In 1908, the Englishman D. Dunn built and tested for the first time a "biplane" aircraft without an O-4 tail. This was followed by a two-seat 0-5 tailless aircraft with a wing sweep angle of about 30°, which showed excellent stability in flight. In 1913, the French firm Nieuport built Dunn's tailless biplane under license and demonstrated it at the Paris Aviation Exhibition. In 1914, the American company Burgess built under license two tailless seaplanes by Dunn, which were in service with the US Navy until 1919.

In the Soviet Union, the development of "tailless" and "flying wings" aircraft began in the 1920s. The leading role in the creation of aircraft of these schemes belongs to B.I. Cheranovsky, who went from gliders (BICH-1] - 1923, BICH-2 "Parabola" - 1924, BICH-4 - 1925, BICH-8 - 1929, etc.) to aircraft (BIC-3 - 1926, BIC-7 - 1928, BIC-14 - 1934, BIC-20 - 1936, BIC-21 - 1938).

Based on the experience of building tailless B.I. Cheranovsky, in 1933-1934. created several tailless gliders - Osoaviakhimovets KhAI and P.P. Postyshev" P.G. Bening, TsAGI-I A.A. Senkova, BP-3 V.N. Belyaeva, MAK-8 M.A. Kuzakov and LAK-I I.K. Kostenko and B.V. Rauschenbach. In 1935 at the Experimental Institute P.I. Grokhovsky developed the G-39 “flying wing” ram fighter, and the Bureau of Special Designs under the direction of V.A. Chizhevsky created a tailless aircraft BOK-5. By the end of the 30s. under the leadership of V.N. Belyaev, a bomber was developed

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DB-LK hybrid scheme (“semi-tailless” or “short-tailed”). In July 1936, the tailless bomber K-12 K.A. made its first flight. Kalinin, the first in the world in its class. In the same year, K.A. Kalinin developed the project of the world's first tailless jet fighter K-15 with a delta wing, which, unfortunately, he failed to complete.

In 1937, the world's first low-aspect delta wing aircraft SAM-9 Strela, designed by A.S. Moskaleva. In 1937-1938. carried out regular transportation of goods on local airlines, the world's first transport

aircraft - "flying wing" KhAI-3 designed by A.A. Lazarev. However, despite the experience accumulated by our aircraft designers, with the beginning of the war in the Soviet Union, all work on tailless and flying wings was practically curtailed.

The successes of Soviet aircraft designers in the 20-30s. became the reason for the intensification of work in the field of creating "tailless" and "flying wings" in other countries. In Germany, A. Lippisch, having begun work on his first tailless aircraft (Delta 1 - 1930, REZ 39 / Delta ÿMS - 1936, OE $ 194 / Delta Uÿ - 1938 .), began at the Messerschmitt firm to create a tailless missile fighter Me 183, which entered service with the Luftwaffe by the end of the war. In addition to the Me 163, during the war he developed a large number of tailless aircraft projects - PR.01, Sh R.04, P R.08, P R.09, 14 R.10, [4 R.11, PR .12, P R.13, PR.15, P R.20, Me 265, Me 329 and Me 334. , Ag E.581.4), Blom and Foss (Wu R.208, Wu R.210, Wu R.212, Wu R.215), BMW (ZiaBotfeg 1), Heinkel (Not R.1079B /T, Not R.1080), etc.

The same active work was carried out in Germany on "flying wings" - the brothers R. and V. Horten (N U - 1937, NUP - 1942, N IX - 1944 and other projects), "Arado" (Ag E.555), BMW (5 tarotweg P), "Focke-Wulf" (Em 1000-1000-1000-Votzheg Progek!), "Gota" (Co R.60), "Heinkel" (Not R.1078, Not R.1079B / 11), "Junkers" (ÿ and EE 130).

In the USA, the Northrop firm, M-IM (1939), M-9M (1941), XB-35 (1946), YB-49 (1947), worked on the creation of “flying wings”.

Japan towards the end of the war. A prototype was tested and work was underway to prepare for mass production of the Mitsubishi]8M1 missile fighter (a licensed version of the German Me 163V fighter).

BEACH-7

Boris Ivanovich Cheranovsky began his career as an aircraft designer in 1921 in the Soaring Flight group of gliding enthusiasts at the Air Force Academy, where he

developed the "flying wing" glider BIC-2 "Parabola". A characteristic feature of the glider was that the pilot was completely accommodated in the thick wing.

Two years later, B.I. Cheranovsky built his first BICH-3 aircraft, which was a BICH-2 glider equipped with an 18 hp engine. With. with a pulling screw blowing around the centrally located vertical tail. This machine had a parabolic wing along the leading edge, the trailing edge of the wing, straight, was occupied by elevators and ailerons. The vertical tail served as a fairing for the pilot's cabin, almost recessed into a thick profile wing with an area of 20 m:.

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The structure of the aircraft was wooden with fabric covering, the weight of the empty aircraft was only 140 kg, the take-off weight was 230 kg. With an 18 hp engine. With. it showed a speed of about 100 km/h, its landing speed did not exceed 40 km/h. So BIC-7 became the first flying aircraft built according to the “flying wing” scheme with a small projection of the cockpit, the fairing of which was the vertical tail. The rudder, blown by the propeller, was very effective.

In 1927-1928. B.I. Cheranovsky performed a number of blowdowns of other models at TsAGI, including a large military parabolic aircraft BICH-5 for two BMW-MI engines. Purges showed the advantage of using elevators and ailerons (levons) with a reverse profile, more convex on the underside, in the “flying wing”, and these controls should have been made suspended under the trailing edge of the wing. This innovation was implemented in the BICH-7 aircraft, released at the end of 1929.

BIC-7 was a development of the BIC-3 aircraft, but with a Bristol-Lucifer engine with a power of 100 hp. With. and with a wing area increased by one and a half times. The rudders are small, without keels, at the ends of the wing. One-wheel chassis with crutches, middle and side. Aircraft tests showed that the landing gear design was unsuccessful, the rudders were not effective enough. It took four years to finalize the design, which resulted in the BICH-7A aircraft.

The modified aircraft had a two-wheeled undercarriage and a tail skid, a closed cockpit for two people, which turned into a very effective vertical tail. The wing is thick, the ailerons and rudders were hung under its rear edge.

coy. The tests carried out confirmed the basic calculations of the designer, the aircraft obeyed the rudders perfectly, was stable both in level flight and in turns. The pilots who tested the BICH-7A noted that “the aircraft is stable in all flight modes, it has no tendency to lose speed, and its control is no different from the control of a normal aircraft”.

Characteristics of BICH-7A: crew - 2 people, power plant - | x "Bristol-Lucifer" with a capacity of 100 liters. s., wing span - 12.2 m and its area - 30.0 mg, length - 4.7 m, empty weight - 627 kg, takeoff weight - 880 kg, maximum speed - 165 km / h, range - 200 km , practical ceiling - 5000 m.

BICH-11 (RP-1)

BICH-11, built in 1932, was originally developed by B.I. Cheranovsky as a “tailless” glider with a trapezoidal wing and a single-wheel landing gear. End "washers" were installed on the wing as rudders. S.P. successfully flew on the BICH-11 glider. Korolev, who proposed to install the OR-2 F.A. rocket engine on the airframe. Tsander, turning the glider into an RP-1 rocket plane. But since the rocket engine was not ready by the deadline, the Scorpion engine with a capacity of 27 liters was installed on the BICh-11 airframe. s., turning it into an aviette that flew successfully. It was one of the first "tailless" aircraft with a trapezoidal wing.

Characteristics of BICH-11: crew - 1 person, power plant - | x "Scorpion" with a capacity of 27 liters. s., wingspan - 12.1 m, its area - 20.0 m?, length - 3.89 m, empty weight - 200 kg.

BICH-14

In 1934 B.I. Cheranovsky developed the parabolic “flying wing” BICH-14, designed to carry five passengers. The aircraft was equipped with two M-11 engines with a power of 110 hp each. With. every. The prototype machine was tested at the Air Force Research Institute. Due to incorrectly calculated centering and imperfection of the control system, the aircraft

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had an accident. After the corresponding modifications, the machine began testing again, but the first flight of the machine almost ended in disaster. Tests of BICH-14 continued until 1937, in the end they ended in failure. The maximum speed did not exceed 220 km/h, which was clearly not enough for that time, and B.I. Cheranovsky did not succeed.

Characteristics of BEACH-14: crew - | man, power plant - 2 x M-11 with a capacity of 100 liters. s., wing span - 16.2 m and its area - 60.0 mg, length - 6.0 m, empty weight - 1285 kg, takeoff weight - 1900 kg, maximum speed - 220 km / h.

BICH-17

In 1935, L.V. Kurchevsky, being the head of the Special Design Bureau of the Main Artillery Directorate (OKB GAU), decided to organize an aviation department in his design bureau and began to recruit specialists. In particular, aircraft designer V.B. Shavrov, who was supposed to organize aircraft production, and at the same time received the opportunity to build his Sh-3 amphibious aircraft.

After unsuccessful tests at the Air Force Research Institute of the BIC-14 aircraft, B.I. Cheranovsky went to work for L.V. Kurchevsky, where he began to develop a new “flying wing”, which received the designation BICH-17. This aircraft was supposed to be a single-seat fighter with an M-22 engine and a tractor propeller, and two APK-4 dynamo-reactive cannons were supposed to be installed as armament. The aircraft BICH-17 had a wing resembling a parabola in plan, the landing gear was a two-wheeled retractable one. In February 1936, when the aircraft was already 60% completed, the department of special works, to which the GAU Design Bureau was subordinate, was disbanded and work on the aircraft was stopped.

The further fate of L.V. Kurchevsky developed tragically - in 1937 he was arrested. In 1956, Kurchevsky's wife received a certificate for Mo 88 4177, which stated that L.V. Kurchevsky died in prison on January 12, 1939.

Characteristics of BICH-17: crew - 1 person, power plant - ÿ x M-22 with a capacity of 480 liters. s., wingspan - 12.24 m, length - 5.0 m, armament - 2 APK caliber 80 mm.

BEACH-20

BIC-20 "Pioneer", built in 1938, was a single-seat "tailless" aircraft with an almost triangular wing. The machine was equipped with an Obier-Dunne engine with a power of 20 liters. with., the cockpit was located in the root of the keel. The chassis was pyramidal non-retractable.

The BICh-20 aircraft was undergoing flight tests in January 1939, after the completion of the tests, a conclusion was issued that the BICh-20 does not differ from conventional types of aircraft in terms of controllability and other flight characteristics.

Characteristics of BICh-20: crew — 1 person, power plant — | x "Obier-Dune" with a capacity of 20 liters. s., wing span - 6.9 m and its area - 9.0 m?, length - 3.56 m, empty weight - 176 kg, takeoff weight - 280 kg, maximum speed. - 160 km / h.

BIC-21

In 1938 B.I. Cheranovsky developed a project for a single-seat aircraft BICH-21, which was a further development of the aircraft BICH-20. BIC-21 was a sports racing

BIC-21

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A tailless aircraft, it was equipped with an MV-6 engine and had a trapezoidal wing of the reverse “gull” type with kinks at the joints of the consoles. Suspended flaps served as elevators and ailerons at the same time. The construction of the aircraft ended in 1940, in 1941 its flight tests began, but the war interrupted these works, and the full flight characteristics were not recorded.

Characteristics of BICH-21: crew - 1 person, power plant - 1 x MV-6 with a capacity of 220 liters. s., wing span - 6.9 m and its area - 9.0 m?, length - 4.74 m, empty weight - 526 kg, takeoff weight - 643 kg, maximum speed - 417 km / h.

BOK-5

In 1937, taking into account the experience of building a "tailless" B.I. Cheranovsky in the Bureau of Special Constructions under the direction of V.A. Chizhevsky developed the tailless aircraft BOK-5, equipped with the M-11 engine. The BOK-5 wing, in contrast to the BICH-7A wing, which was parabolic in plan, was a trapezoid in plan with an almost straight trailing edge and a swept (about 28°) leading edge of the wing. The entire rear part of the BOK-5 wing was structurally completely movable and served as an adjustable stabilizer; with the help of a worm gear and a special steering wheel, the pilot could easily turn it at angles from -5 ° to + 3 °, adjusting the balance of the machine and the effort on the control stick. Outboard ailerons and elevators were attached to this unusual stabilizer.

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BOK-5

Flight tests of the experimental machine began in September 1937 at the Air Force Research Institute. In total, the test pilots performed 65 flights with a total duration of 20 hours 42 minutes, the machine made a good impression on the pilots. As it was written in the test report: “The tailless aircraft BOK-5 has excellent stability and controllability, is easy to fly and is quite accessible to pilots of average and even lower than average qualifications.”

During the tests, the following characteristics were achieved: maximum speed (with an engine of only 100 hp) - 174 km/h, landing speed - 85 km/h, rate of climb near the ground - 120 m/min, practical - pushing - 4850 m, takeoff run - 120 m.

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In 1938 V.A. Chizhevsky presented to the military a modified copy of the BOK-5, which was distinguished by a slightly increased size and angle of inclination of the fuselage in the parking lot, a reduced area of the ailerons and an increased area of the rudder. At the same time, the weight of the car increased by only 32 kg. In August 1938, the modified BOK-5 was shown at an air parade in Tushino, where it made three flights, after which the car was transferred to the Air Force Research Institute for state tests. The conclusion of the Research Institute of the Air Force after the completion of the tests read: “The tailless aircraft BOK-5 is easy to fly, has good stability at speeds up to 150 km/h and controllability. Allows the performance of aerobatics.

Based on the test results, the leadership of the Air Force Research Institute recommended that the People's Commissariat of the Defense Industry issue an assignment to V.A. Chizhevsky to create a "tailless" bomber BOK-6 with two M-34 engines. However, at the beginning of 1939, V.A. Chizhevsky was arrested on a false denunciation as an “enemy of the people”, all work on BOK-5 was stopped.

Characteristics of BOK-5: crew - 1 person, power plant - | x M-11 with a capacity of 100 liters. s., wing span - 9.86 m and its area - 23.15 m?, length - 4.37 m, height - 2.0 m, empty weight -

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596 kg, takeoff weight — 764 kg, maximum speed — 174 km/h, range — 600 km, practical ceiling — 4850 m, armament — 6 ShKAS machine guns of 7.62 mm caliber and 2000 kg of bombs.

G-39 "Kukaracha"

Aircraft G-39 "Kukaracha", created in 1935 by V.F. Bolkhovitinov, S.G. Kozlov and A.E. Kaminov under a contract with the Experimental Institute P.I. Grokhovsky, was supposed to be used as a specialized ram fighter.

The aircraft, made according to the scheme of a delta "flying wing" with a sweep angle along the leading edge of 38° and vertical control surfaces at the wingtips, was equipped with an M-11 engine with a pusher propeller. G-39 had a four-wheel chassis. Behind the cockpit, in the central part of the wing, there was a semicircular cutout - the location of the pusher propeller. The engine was attached to the power frame of the aircraft with
with the help of a special

mouth device. This was the implementation of the technical solution of P.I. Grokhovsky, which he described in his invention “Installation of a propeller group in the middle part of the fuselage”. Turning the engine made it possible to direct the air flow from the propeller at a certain angle with respect to the horizontal axis of the aircraft, creating an “air cushion” under the fuselage during takeoff and landing. The formation of an "air cushion" led to an increase in the aircraft's lift, which allowed it to reduce takeoff and landing speeds and operate normally from short runways. In modern terms, it was a prototype aircraft with a deviated thrust vector of the power plant to create the effect of an “air cushion” under the fuselage.

Nurturing the idea of creating a ram fighter, on the design of which P.I. On February 25, 1935, Grokhovsky received an author's certificate; he proposed to install a knife along the entire leading edge of the wing, which was a thin metal strip of high-strength steel. In the nose of the vehicle, it was planned to install a rod protruding far forward, which was also the barrel of an air gun. The tip of the rod was connected to the wing consoles with a thin steel cable. A similar device was implemented at the end of the war on the plane of A.N. Tupolev Tu-2 "Paravan", which was intended to break through the lines of barrage balloons.

The development and construction of the Cucaracha took place in difficult conditions, since the machine was unscheduled, and no funds were allocated for it. The construction was carried out in the premises of the workshops of the Air Force Academy. Weak technological equipment of the production base made it necessary to rework the project, adjusting it to the capabilities of the workshops. The closed cockpit was replaced with an open one, the semicircular cutout for the propeller was straightened, the engine received a fixed mount, the delta wing was swept, and its rear part was turned into a horizontal stabilizer of a large area and scope. They also refused to install elements of a ramming strike.

At the end of the spring of 1935, the redesigned Cucaracha was rolled out to the airfield for testing. Tested the machine V.P. Chkalov, but he never managed to get the plane off the ground. Several factors contributed to the failure. For self

summer was clearly low engine power. The fuselage, wing and landing gear, which shaded the propeller, worsened the situation even more, significantly reducing thrust. The poor build quality of the machine also played a negative role: wrinkles on the close-fitting, rough surface of the wing, paint streaks on all surfaces of the aircraft.

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After this failure, P.I. Grokhovsky decided to build a new aircraft. Three months later, the POLVILOSB press reported: “The Experimental Institute of the People's Commissariat for Heavy Industry in Leningrad is starting to build a flying wing aircraft with a 100 horsepower engine. The plane will be able to lift four passengers and fly at a speed of 220 kilometers per hour. Within two and a half months, the aircraft must be built, and it will take part in an all-Union flight organized by Pravda, the Central Committee of the All-Union Leninist Young Communist League and the Central Council of Osoaviakhim. However, this aircraft was never built due to the dissolution of the Experimental Institute of P.I. Grokhovsky.

Characteristics of the G-39: crew - 1 person, power plant - 1 x M-11 with a capacity of 100 hp. s., wing span - 6.8 m and its area - 14.2 m ”, length - 8.84 m, height - 3.16 m, empty weight - 520 kg, take-off weight - 698 kg, maximum speed - 195 km/h, range - 600 km, practical ceiling - 4000 m, flight duration - 3 hours.

DB-LC

In 1933-1936. V.N. Belyaev was engaged in researching models with different wing shapes, including those with a negative swept wing. It turned out that a negatively swept wing has a more favorable distribution of circulation over the span compared to a straight wing and a normal-swept wing. In addition, it was found that for such a wing, with an increase in aspect ratio, the aerodynamic load in the end sections decreases. Within the framework of these studies, V.N. Belyaev developed gliders with a negative swept wing along the leading edge - a single-seat BP-2 (TsAGI-2) and a two-seat BP-3. The BP-2 glider participated in the IX glider rally in Koktebel, and the BP-3 was even built in a small series. In 1935 M.A. Kuzakov developed a single-seat training glider MAK-8 of the same aerodyne

DB-LC

mic scheme, and a year later V.I. Emelyanov created two-seater gliders KIM-2 and "Stakhanovets". The operation of these gliders made it possible to determine the controllability characteristics of an apparatus with a given wing sweep.

Based on the experience gained, in 1938 V.N. Belyaev designed an experimental aircraft with a negative swept wing and a 430 hp engine. With. According to the calculations of the designers, the maximum speed of their device was to correspond to 510 km/h, and it could easily perform all aerobatic maneuvers. This aircraft was built at the Kazan Aviation Institute in 1941.

In 1935, Aviavnito announced a competition for the development of a high-speed passenger aircraft. The second place was won by V.N. Belyaev project of a twin-body aircraft with a negative swept wing, this original aircraft became the prototype for the DB-LK bomber, work on which began in 1938.

DB-LK (long-range bomber - “flying wing”), strictly speaking, was a “semi-tailless” or “short-tailed”. The aircraft had a specific “butterfly” wing with a strongly pronounced negative sweep, a developed vertical tail was placed on the rear of the center section, and part of the keel went under the center section and carried the tail wheel. Installing the horizontal tail

moose high on the keel, behind the trailing edge of the center section. Two fuselages were formed by elongated engine nacelles with two M-87B engines, in the rear part of the fuselages there were rifle installations (two ShKAS machine guns each) in the form of transparent “rings” rotating around the fuselage axes and providing shelling of the rear hemisphere.

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The pilot and gunner were located in the left fuselage, and the navigator and gunner-radio operator were located in the right fuselage. The aircraft control was duplicated. The cockpit canopy was shifted slightly to the left for a better view during landing; the canopy covers were moved back for entry and exit. In addition to the four ShKAS tail machine guns, there were also two coaxial ShKAS machine guns in the leading edge of the center section, mounted along the axis of the aircraft and deviated by an angle of +10 ° to the sides if necessary, with remote control. The bomb armament is normal in 1000 kg of bombs on the internal suspension in the fuselages in various combinations: from four FAB-250 to 58 smaller bombs. In overload it was possible to take two FAB-1000 or two FAB-500 on the outside suspension.

During state tests, more than 100 flights were performed. The commission recognized that the aircraft did not pass state tests due to poor visibility for the pilot and navigator when aiming at the target and a number of defects and imperfections in the design. It was proposed to eliminate all the shortcomings and present the aircraft again. Defects were eliminated on the machine, a middle cabin was installed to improve visibility, and M-71 engines with a power of 2000 hp were to be installed. s., at the beginning of the war, all work on DB-LK was finished. The DB-LK went down in history as the world's first reverse-swept bomber.

Although the negative swept wing was rejected by our aviation management, Germany was interested in the unusual aerodynamic layout, during the Second World War, German aircraft designers quite often used such a wing in their projects. Professor A. Lippisch was one of the first to study this wing in Germany; by 1939, within the framework of the secret “Project X”, he developed and tested the Og5 42 Kogtogap glider. During the war, German firms developed such projects of aircraft with a negative sweep of the wing as jet bombers BMW Sÿhpebotbeg Pi "Junkers" Lee 287, re

active fighters Blom and Foss Wu R.209.02, Focke-Wulf Em Jareg R.G and Heinkel He 162C.

Characteristics of DB-LK: crew - 4 people, power plant - 2 x M-87B with a capacity of 950 hp each. s., wing span - 21.6 myo area - 56.87 m ?, length - 9.78 m, height - 3.65 m, empty weight - 6004 kg, takeoff weight - 9061 kg, maximum speed - 488 km/h, rate of climb - 368 m/min, range - 1270 km, practical ceiling - 8500 m, armament - 6 ShKAS machine guns of 7.62 mm caliber and 1000 kg of bombs (overload 3000 kg).

K-12 (VS-2)

At the beginning of 1933, in the Design Bureau of KA. Kalinin, the development of the K-12 aircraft (VS-2 - military aircraft) began. It was assumed that the K-12 would be able to perform the functions of a light bomber, military reconnaissance, spotter, photo reconnaissance, and, if necessary, a transport ambulance aircraft. The maximum speed of the vehicle was to be 250 km/h at an altitude of 3000 m, the radius of action was 350 km, and the bomb load was 300 kg.

The K-12 was a “tailless” equipped with two M-22 engines, in which the keels with rudders were located at the ends of the wing, and the roll and pitch controls were along the trailing edge of the wing. The rudders deflected separately and only to the outside. The control of the aircraft was dual - in the cockpit there was a steering wheel, in the cockpit of the navigator - a removable handle. The characteristics of the stability and controllability of the aircraft were previously studied on a specially built 1:2 scale airframe of a similar design. The armament of the aircraft consisted of bow and stern gun mounts with two ShKAS machine guns in each, a bomb load weighing up to 500 kg was suspended in the fuselage bomb bay.

In July 1936, factory tests of the K-12 began. After completion of the tests, it was noted that “... the aircraft designed by Comrade Kalinin, despite its relatively large size,

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has good takeoff and landing characteristics. It is not very sensitive to turbulence and is very stable in flight. In October 1936, the aircraft was handed over to the Air Force Research Institute for state tests. August 18, 1937 K-12 was first shown at the air parade in Tushino. He looked very

unusual, since at the direction of the head of the Air Force Research Institute P.I. Baranov's plane was painted to look like the fabulous Firebird. The appearance of such an unusual machine in the sky made a great impression on the members of the government and the command of the Red Army who were present at the celebration.

After the end of state tests, on December 12, 1937, Ya.V. Smushkevich signed an official decision on the test report of the K-12 aircraft, which stated: “To note that the VS-2 aircraft is of great interest to the Air Force in its concept ... To ensure the refinement of the VS-2 aircraft by March 1 1938, and then present it for testing ... "

Within two months, the car was improved by installing more powerful M-25 engines and a retractable electric landing gear, and the armament was somewhat changed. After testing the modified machine, in April 1938, the state commission recommended that the K-12 be put into mass production. However, soon K.A. Kalinin was repressed and shot in a Voronezh prison. A series of ten K-12 machines was in production at that time, but soon, by order of the people's commissar of the defense industry, all work on them was stopped. The K-12 (VS-2) entered the history of aviation as the world's first real tailless bomber that met all the requirements of the military tactics of its time.

Characteristics of the K-12: crew - 3 people, power plant - 2 x M-22 with a capacity of 480 hp each. s., wing span - 20.95 m and its area - 72.5 m?, length - 10.3 m, height - 3.65 m, empty weight - 3070 kg, takeoff weight - 4200 kg, maximum speed - 219 km/h, range - 1100 km, practical ceiling - 7100 m, armament - 4 ShKAS machine guns of 7.62 mm caliber and 500 kg of bombs.

K-15

In 1936 K.A. Kalinin started designing the K-15 aircraft with a rocket engine. It was a “tailless” aircraft with a large swept delta wing and a large triangular keel, in the root part of which the cockpit was located. Unfortunately, no data on the K-15 aircraft has been preserved, since after the arrest of K.A. Kalinin, all technical documentation was destroyed.

However, it must be said that in 1938 a similar aircraft, but having a front horizontal tail, was developed by the Frenchman Nicolas Roland Payen. As a power plant, he intended to install a ramjet, but due to the unreliable operation of the ramjet, he had to put a conventional piston engine on his Ra.22 aircraft. The Germans, having occupied France at the beginning of the war, seized a prototype of the Ra.22, which at that time was being tested in the Chalet Medo wind tunnel. Intrigued by the aircraft, they tested it in flight in 1942 and began preparing it for shipment to Germany for a full test program at the Luftwaffe Flight Test Center in Rechlin. But while being sent to Germany, the aircraft was destroyed by Allied bombers.

An interesting fact, at the end of the war in Germany, A. Lippisch developed a project for a “tailless” jet fighter M R.13a, which had a thick delta wing and a large triangular keel, with a cockpit located in it. At the end of the war, a non-powered version of Lippisch's "tailless" glider, OM 1, was built, which was captured by the Americans and sent to the USA for study. Surprisingly, the plane of A. Lippisch was structurally very similar to the plane of K.A. Kalinin, developed over nine years

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earlier. Moreover, the brothers R. and V. Horten, who worked independently of A. Lippisch, also completed the projects of their aircraft H XIII, N [XV and N XIV] according to this scheme.

The question arises: either A. Lippish and the Horten brothers used the recommendations of German aerodynamic scientists who independently came up with such a scheme, or this was the work of German intelligence, which obtained secret information about the K-15 aircraft. However, the fact remains: K.A. Kalinin, before A. Lippisch and the Horten brothers, developed a project for a tailless jet aircraft with a delta wing.

CAM-7 "Sigma"

Aircraft SAM-7 "Sigma" A.S. The Moskaleva was a tailless escort fighter built for the first time in the Soviet Union. The prototype, completed in 1934, was equipped with the M-34R engine, the wing was swept and had a slight elongation. Washers were placed at the ends of the wing, which played the role of vertical tail, with high rudders.

you served as slotted flaps located along the entire trailing edge of the wing, the ailerons were their outer part.

A gunner and a retractable turret with twin ShKAS machine guns were placed in the rear fuselage, two ShKAS machine guns were mounted on the engine. The aircraft had landing gear retractable into the wing. The speed of the aircraft at an altitude of 4000 m was expected to be more than 600 km/h.

Flight tests of the experimental machine began after the end of the test of the tailless bomber K-12.

As mentioned above, by order of the people's commissar of the defense industry, all work on the K-12 was stopped. And since the SAM-7 aircraft aerodynamically did not differ much from the K-12 scheme, therefore, the attitude of the aviation industry management towards the SAM-7 was just as negative. It was decided to stop further tests of the experimental machine because of the alleged futility of tailless aircraft.

Characteristics of SAM-7: crew - | man, power plant - 1 x M-34 with a capacity of 750 liters. s., wing span - 9.6 m and its area - 20.0 mg, length - 7.0 m, empty weight - 1000 kg, takeoff weight - 1480 kg, maximum speed - 500 km / h, range - 800 km , practical ceiling - 9200 m, armament - 4 ShKAS machine guns of 7.62 mm caliber.

SAM-9 "Strela"

In 1934 A.S. Moskalev developed a project for a high-speed fighter-interceptor, made according to the “flying wing” scheme of small elongation. The aircraft was equipped with two Hispano-Suiza engines, which rotated coaxial propellers on one shaft, the pilot was reclining in the cockpit. However, this project of an unusual aircraft did not arouse interest among the leaders of the aviation industry. Only after in 1936 there were reports of American studies on small aspect ratio wings, A.S. Moskalev was given an assignment to develop a light experimental aircraft analogous to the Sigma fighter. This is how an aircraft project called CAM-9 "Strela" appeared. In TsAGI, its model was purged, and in the spring of 1937, joint tests with TsAGI of a prototype aircraft on a ski and

on a wheeled chassis.

The aircraft had a delta wing with an elliptical outline in plan, the vertical tail was normal, horizontally

There was no plumage, elevators of considerable size occupied the rear part of the wing and, deviating at unequal angles, also performed the functions of zlerons (zlevons). The aircraft is based on

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powered by the Renault engine, the pilot was located in a closed cockpit.

Flight tests of the aircraft began in July 1937, for the first time the machine took off from the ground on August 7. Due to the unusual layout and peculiar behavior of the aircraft, the first flights on it were very difficult. Initially, the aircraft, which had not yet been mastered by the pilots, did not take altitude, but in September the aircraft had already reached an altitude of 1500 m. Tests of the Strela continued until the middle of summer 1938. scheme. Based on the test results, the design of the aircraft was improved: the area of the vertical tail was increased by 30 percent and end washers were installed according to the type of the Sigma aircraft. After completion, the Strela underwent additional tests, the test results were positive. At the end of 1938, the leadership of the aviation industry, who considered that the task was completed, ordered to stop further work and destroy the aircraft.

After finishing work on the Strela, the NKAP suggested A.S. Moskalev to develop a project of a combat aircraft according to the “flying wing” scheme of small elongation. However, the designer was able to develop such a project only in 1944, it was the RM-I project (see in the “Jet Aircraft” section).

Characteristics of SAM-9: crew - 1 person, power plant - 1 x MV-4 with a capacity of 140 liters. s., wing span - 3.55 m and its area - 13.0 m?, length - 6.15 m, empty weight - 470 kg, takeoff weight - 630 kg, maximum speed - 310 km / h, practical ceiling - 1500 m

"Steel-5"

In 1933 in OKBA.I. Putilov, the development of a “flying wing” passenger aircraft with two M-34F engines with a capacity of 900 hp began. With. and with double vertical plumage. The cockpit protruded slightly from the tip of the wing, the span of which was 23.0 m, and the area was 120 mg. The purpose of the aircraft is a long-range passenger express train for 18 passengers. The weight of the empty aircraft was about 5500 kg, the takeoff weight was about 8000 kg.

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302P (model)

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A-206 (front view)

A-206

BI-1

BI-1 with additional ramjet (model)

and SYNEN?

B-25

DB-3 (front view)

DB-3

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I-15 (side view)

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I-207 (model)

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IL-2 (colour variant)

IL-4 (right view)

IL-4

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IL-10 (side view)

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Cruise missile 212 (rear view) K.E. Tsiolkovsky for interplanetary travel

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MiGG-3 (front view)

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MiG-3

Pe-2 (side view)

Pe-2 (front view)

Pe-2

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Pegasus (model)

Pegasus (model, top view)

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SPL (model)

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Tu-2 (rear view)

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To check the correctness of the adopted design solutions, a flying model "Stal-5" was developed, which was a light aircraft made according to the "flying wing" scheme with a span of 6.0 m and an area of 15.0 m², with two engines " Salmson" with a capacity of 45 liters. With. The aircraft was tested in 1935, a number of flights were carried out on it, as a result of which it turned out that the aircraft was quite stable in the air, but very strict in piloting. This circumstance caused a decrease in interest in the Stal-5 aircraft. At the same time, the construction of the Stal-11 aircraft was underway, so the development of the Stal-5 was delayed, and the aircraft was not built.

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KhAI-3

Gliderlet KhAI-3 "Sergey Kirov" was developed by the team "Aviavnito" under the leadership of Alexander Alekseevich Lazarev. The machine, equipped with the M-11 engine, was a “flying wing”, on the trailing edge of the wing consoles there were ailerons that worked as elevators and were divided into two parts along the span. Glider turns in the horizontal plane were achieved with the help of spoilers placed at the ends of the wing and controlled by pedals. Temporarily, the keel and rudder were placed on the center section. Two passenger (cargo) cabins were located on the center section, the pilot's seat was in the right cockpit. The number of passenger seats is 12.

The tests began on September 14, 1936, the general conclusion on the results of the tests was positive. The gliderlet could take off on its own with a mass of 2200 kg, it gained an altitude of 1000 m in 25 minutes.

In 1936-1937. built, but not completed, the KhAI-8 aircraft, which was a KhAI-3 glider, but with two M-11 engines mounted on racks above the wing, with pulling
screws.

Characteristics of KhAI-3: crew - 1 person, power plant - ÿ x M-11 with a capacity of 100 hp. s., wing span - 22.4 m and its area - 78.6 m?, length - 6.8 m, empty weight - 1440 kg, takeoff weight - 2200 kg, maximum speed - 135 km / h, practical ceiling - 2000 m, payload — 12 passengers.

5. COMPOSITE AIRCRAFT

The idea of creating aircraft carriers arose during the First World War, when experiments began in Germany with fighters carried by huge airships - airships. The use of fighters was supposed to solve the problems of timely detection of enemy aircraft and the defense of Zeppelins from their attacks, as well as to ensure operational communication between the airship and its command during combat

tasks.

After the First World War, similar experiments were carried out in England with the airship K.33 and the aircraft OH.53 Nittipebga and E.1 Sate!. Similar work was carried out in the United States: in 1924, with the testing of the docking of the communications aircraft Ergy to a special trapezoid under the airship TS-3, and in 1929 with the aircraft of the Voyush company and the airship [05 Apriles.

In 1933, the US Pacific Fleet included two airships AKgop and Masop, built under the 5Kuÿÿook program. Each of them could carry four Cipizz ÿ9ÿ aircraft, the aircraft were located in a special hangar under the airship hull. In 1934, the ACOP airship crashed in a storm, killing 76 people, including Rear Admiral William Moffett, head of the Bureau of Aeronautics of the US Navy. The 5KuhookKk program was terminated on February 12, 1935, when Masop crashed off the coast of California, killing two members of its crew and four pilots of EEC aircraft.

In the Soviet Union, the idea of creating aircraft carriers was implemented using bomber aircraft; this work was the first in the world within the framework of the Zveno project.

performed by Vladimir Sergeevich Vakhmistrov in the early 1930s. V.S. During the Civil War, Vakhmistrov fought in the Air Force of the Red Army, in 1930 he graduated from the Air Force Academy, worked at the Air Force Research Institute with flying targets. It was he who introduced the concept of a composite aircraft as a combination of several aircraft rigidly coupled (not in tow) and flying together in
purposes:

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- deliveries of fighter planes over distances exceeding their radius of action, due to the fuel of an aircraft with a long flight range;

- increasing the range of escort of a heavy aircraft by fighters based on it, taking off from it and landing on it; |

- the use of fighters as dive bombers for accurate targeted bombing with such large bombs that a fighter can
can't lift during takeoff;

— facilitating the takeoff of an overloaded aircraft with the help of an auxiliary aircraft.

Positive results of work on "Links" by V.S. Vakhmistrov in the pre-war years, as well as their combat use in the first months of the war, became the reason for the start of similar work in Germany. In 1942, the Messerschmitt company was developing the Me 328 fighter, which in a joint flight was supposed to fly on the back of the He 177 or Me 264 carrier. enemy fighters, after completing the combat mission, return to their own airfield and land on a retractable ski. As a fighter-bomber, the Me 328 unhooked from the carrier not far from the enemy zone, penetrated it at low altitude and attacked a ground target or a ship with a bomb, after which it returned to its own airfield. In addition to the options for separate performance of functions, a variant of combined combat use was also considered: first, the Me 328 performs the tasks of a light bomber, then returns to the carrier aircraft, refuels and performs the functions of an escort fighter. But the Me 328 program was terminated in 1944, not a single Me 328V-0 machine from the ordered pre-production batch was built.

At the end of 1944-beginning of 1945, the German company Daimler-Benz developed two versions of the composite aircraft project. The first variant of the project, the aircraft OV R.A, was a combination of an aircraft-carrier Zssepe botrengareg and a one-time bomber. The carrier aircraft (ÿ.ÿÿ) had a straight wing, on which four Nez 021 turboprop engines were located. The non-retractable high two-pillar landing gear had three wheels located one behind the other, covered with fairings, on each rack.

Under the fuselage, between the landing gear of the carrier aircraft, a bomber (R.A.P.) was suspended with a butterfly tail and two VMU 018 turbojet engines under the swept wing. The bomber did not have a landing gear, up to 30,000 kg of bombs were placed in the bomb bay, the crew of 3 or 4 people was located in a pressurized cabin in the forward fuselage. It was assumed that after uncoupling from the carrier, the bomber would continue flying on its own. After completing the task, the bomber lay down on the reverse course and flew until the fuel was completely depleted. The parachute crew had to leave the vehicle over the sea and be picked up by special Luftwaffe rescue units.

The second version of the project was designated OV R.V. The carrier aircraft R.V [had a two-beam tail, the power plant consisted of six OV 6030 piston engines: four engines drove the pulling propellers, and two engines, located coaxially with the outer engines, drove the pushing propellers. The design of the R.V.P bomber was also somewhat changed: a spaced tail was installed, and one OV 06 turbojet engine with a thrust of 12,930 kg was installed on top of the fuselage. Two crew members were housed in a pressurized cabin in the forward fuselage. Until the end of the war, the variants of the project OV R.A and OV R.V were not implemented.

"Link"

In 1931 V.S. Vakhmistrov developed a project to use the TB-1 as an aircraft carrier carrying two I-4 fighters on its wing. Such a composite aircraft was named “Link-1”.

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For use as part of the “Link”, the TB-1 bomber was modified by strengthening the chassis and installing rod pyramids on the wing, to each of which at three points

fastened fighter. On the ground, I-4 fighters rolled onto the wing along wooden ramps. The takeoff and flight of the "Link" took place with the simultaneous operation of the engines of the carrier and fighters; during the joint flight, the fighters were fed with fuel from the tanks of the carrier. The use of the "Link" made it possible to double the range of the fighters and use them as dive bombers, since the fighters could carry bombs of a caliber that they could not take off on their own. In addition, portable fighters were supposed to provide bombers with protection from enemy fighters.

The first flight of Zvena-1 took place on December 3, 1931, the take-off weight of the system was 8180 kg. TB-1 was piloted by A.I. Zalevsky, and fighters - V.P. Chkalov and A.F. Anisimov. I-4 was uncoupled at an altitude of 1000 m at a speed of 160 km/h. After the end of the tests, V.S. Vakhmistrov and all three pilots were awarded the Order of the Red Star.

In September 1933, the following modification "3veno-1a" appeared - the TB-1 bomber with two I-5 fighters on the wing, and in August 1934 - "Link-2" - the TB-3 bomber with three I-5 fighters -5 on the wing. During the tests of these versions of the “Links”, various design solutions for fastening fighters were tested. The docking and separation technique was worked out quite clearly and did not cause any complications. However, there were cases when a fighter damaged the corrugation of the carrier's wing plating with a propeller or wheels. There was another significant drawback: rolling the fighters onto the wing of the carrier was a laborious operation (it was especially difficult with the central fighter). |

Therefore, V.S. Vakhmistrov modifies the very concept of a composite aircraft, proposing to suspend fighters under the wing of the carrier and testing the technique of hooking fighters in the air. As a result, the following modifications of composite aircraft appeared: Zveno-3 - TB-3 + two I-2 under the wing, Zveno-5 - TB-3 + I-7 under the fuselage with hook-up in the air (March 1935), "Link-6" - TB-3 + two I-16s under the wing (August 1935), "Link-SPB" (composite dive bomber) - TB-3 + two I-16s under wing (July 1937) and "Link-7" - TB-3 + three I-16s with pickup in the air (November 1939).

In connection with the work on the "Link" V.S. Vakhmistrov was designed in 1934-1935. fighter-interceptor I-3e with a landing ski, adapted for flight under the wing of the carrier with uncoupling from it in flight and reattachment, as well as for landing on the ground. The aircraft had a wingspan of 7.75 m and an area of 10 m², a flight weight of 1910 kg, and an estimated speed of 518 km/h, which was provided by the Gnome-Ron engine with a power of 850 hp. With. The construction of the aircraft was stopped in 1936 |

In November 1935, a combined version was tested under the name "Link-Aviamatka" - TB-3 + two I-16s under the wing + two I-5s on the wing + I-7s under the fuselage with hooking in flight. This composite aircraft was supposed to be used as an air defense system. According to the project of V.S. Vakhmistrova "Link-Aviamatka" rose into the air and patrolled over the protected object. When enemy aircraft appeared, the fighters attached to the carrier detached and were ready to repel the attack. The time for putting them on alert was many times shorter than when taking off from the airfield, and the “Link” could stay in the air over the object for much longer than a fighter patrol.

Zveno-SPB was successfully tested in the summer of 1938. Marshal K.E., in particular, spoke in favor of adopting the system. Voroshilov. In October, the People's Commissariat of Defense of the USSR issued a decree on the adoption of Zvena-SPB for arming the Red Army Air Force and Navy aviation. By the same decree, the People's Commissariat of the Defense Industry undertook by February 1, 1939

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prepare for these purposes 40 TB-3 AM-34RN aircraft (20 aircraft for the Red Army Air Force and 20 aircraft for naval aviation) and 80 I-16 aircraft (40 for the Red Army Air Force and 40 for naval aviation).

However, work on the introduction of the already tested Zveno-SPB system throughout 1939 did not move forward. Moreover, the initial order for 40 carriers was reduced to 12 copies, and the aircraft factories, inundated with a huge plan for the production of aircraft, refused to fulfill this number. In June 1940, tests began on the head serial system with I-16 type 24 fighters with M-63 engines. In total, five Zveno-SPB kits were equipped, which entered service with the 2nd Special Squadron of the 32nd Fighter Aviation Regiment of the 62nd Aviation Brigade of the Cher Air Force.

nomorskoy fleet (base - Evpatoria). Until the end of the year, the squadron was actively working on the tactics of using new weapons, with warships being the main targets. In January 1941, the command of the fleet, however, lost interest in this unusual formation, called here by the name of the squadron commander "Shubikov's circus", and ordered the systems to be dismantled. They returned to them only in the summer of 1941, when the war was already in full swing.

Since the beginning of the war, the aircraft of the Black Sea Fleet repeatedly bombed the territory of Romania, simultaneously with Germany, which attacked the Soviet Union. The main targets were eight large oil refineries in the vicinity of the city of Ploiesti, which covered more than a third of the fuel needs of the Luftwaffe and Wehrmacht armored corps; as well as a railway bridge across the Danube River near Cernavody station, 60 km west of Constanta, under the lower deck of which the Ploiesti-Constanta oil pipeline passed.

Repeated attempts by the 63rd bomber brigade of the Black Sea Fleet, using SB and DB-3 bombers, to destroy the bridge were unsuccessful. It was decided to urgently restore the systems of V.S. Vakhmistrov for subsequent combat use. After an order from Moscow on combat use followed on July 22, under the leadership of V.S. Vakhmistrov, three "Links" were restored.

On July 26, the first sortie took place. The first blow was supposed to be delivered against the port facilities of Constanta. In broad daylight, a pair of TB-3s approached the Romanian coast and, at a distance of 40 km, detached four I-16 fighters armed with two FAB-250 bombs each. Having bombed the oil refinery, the four I-16s safely left the impact site and left for Odessa at high speed, and after refueling flew to Evpatoria.

To strike at the Chernavodsky bridge, three sets of "Links" were already prepared, their departure took place on August 10 at 3 am. Due to a malfunction, one “Link” returned to the base from the middle of the way, the remaining two “Links” continued to fly towards the target. 15 km from the coast, the I-16 fighters disengaged from the carriers, after which they bombed the target from a dive and landed at the Odessa airfield at 6:40 in the morning. On August 13, the raid on the bridge was repeated, this time

stew dive bombers. Everything was the same as in the previous flight, only the start time was shifted by half an hour. The attack took place at 5:50, the pilots noted five direct hits, one bridge truss was completely destroyed. On the way back, the six stormed the enemy infantry in the Sulina area, and at 07:05 landed in Odessa. This was followed by refueling and a flight to Evpatoria.

The success achieved renewed the interest of the Navy leadership in the Zveno-SPB system, their number was brought up to five sets, however, further re-equipment was limited by the insufficient number of TB-3 aircraft with M-34RN engines. Of those available in the fleet

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twelve of these machines, five were converted, and the remaining seven were left for transport operations. On August 16, the commander of the Navy, Admiral Kuznetsov, turned to Stalin with a request to receive 10 such bombers from the Red Army Air Force. However, the losses of these slow-moving giants in the first months of the war were so great that the TB-3 was never allocated.

On August 17, six I-16 fighters, having unhooked from their carriers, successfully bombed the floating dock in Constanta. At the end of the month, dive bombers were used to destroy the crossings across the Dnieper in order to deter the German offensive. On August 28, two "Links" took off from the Evpatoria airfield and headed for the Zaporozhye region. At dawn, 30 km from the city, I-16 fighters made a detachment. The raid was sudden and accurate, all four left without losses. On September 8, Zveno-SPB, in cooperation with Yak-1 escort fighters, destroyed the crossing in the Berislav area, there were losses - one Yak-| and one I-16.

The subsequent combat operations of the "suspension units" took place in conditions of an increasingly deteriorating combat situation for the Soviet side, so their further use became episodic. Operations using Zvena-SPB continued until the autumn of 1942, but then stopped due to the great vulnerability of TB-3 carriers. In total, more than thirty sorties were made, which, due to their high efficiency, became one of the most successful military actions of Soviet aviation.

V.S. Vakhmistrov proposed to develop a new version of the "Link", in which the heavy bomber TB-7 would act as a carrier, and LaGG-3 or LaGG-3 fighters would be placed under its wings.

MiG-3. The maximum flight weight of the entire system (TB-7 + 2 fighters with two FAB-250s each) did not exceed 33,500 kg. The maximum speed of 405-420 km/h was achieved at an altitude of 6000 m with all six engines operating at nominal speed, the flight range could be 1320-1450 km, and its duration - 4.5-5 hours. in the middle of the way, the combat radius of the "Link" reached 850-950 km. However, at the beginning of 1942, the TB-7 bomber was taken out of production.

V.S. Vakhmistrov developed further versions of the "Link", in which it was supposed to use the GTS flying boat and the experimental heavy flying boat MTB-2 (ANT-44) as carriers, and the I-15bis, I- 16, I-180, LaGG-3, MiG-3. However, by that time the mass production of Pe-2 bombers partly removed the problem of hitting small targets from a dive, so the Soviet Air Force abandoned the further use of composite aircraft.

Characteristics of Zveno-SPB: crew - 8 people, power plant - 4 x M-34FRN with a capacity of 900 hp each. s., wingspan - 41.8 m, length - 24.4 m, take-off weight - 22,000 kg, maximum speed - 268 km/h, range - 700 km, armament - 2 machine guns caliber 7.62 mm and 1000 kg of bombs.

MPI

In 1936, in KB-21 of the 3rd Main Directorate of the People's Commissariat of the Defense Industry under the leadership of G.S. Vasiliev developed a project for a suspended seaplane IS-“Alpha” MPI (marine suspended fighter). A special feature of the MPI was a float drawn into the fuselage on a movable truss. With the float retracted, the fighter hung under the carrier aircraft (TB-3, DB-3 or TB-7), after being delivered to a given area, it unhooked and performed the task, after which it returned to the base and landed on the water. However, the project is not real
called.

MP (LTDD)

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By the summer of 1939 N.G. Mikhelson developed a suspended torpedo bomber-motor glider, this device received the designation MP (sea suspended) or LTDD (long-range flying torpedo).

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actions). The MP was a monoplane flying boat with an M-100 engine of 750 hp. with., installed on a special deviating motor mount to reduce the takeoff run when the vehicle takes off from the water after attacking the target.

On July 29, 1939, the project was considered and the construction of a prototype was started at plant No. 23. After the arrest of N.G. Michelson, this project was led by V.V. Nikitin, but work progressed very slowly. The aircraft was 50% ready, but on July 23, 1940, on the basis of the order of the People's Commissar of the Navy, all work on the MP was stopped, and the unfinished prototype was destroyed.

6. HELICOPTERS

A great contribution to the creation of the helicopter industry in our country was made by Boris Nikolaevich Yuryev, who developed his first helicopters in 1909-1914. In 1925, when scientific and design work in this area began at TsAGI, under the guidance of Professor B.N. Yuryev, studies began on various modes of the helicopter propeller, on the choice of its optimal parameters and on other issues related to the creation of a helicopter. At the end of 1926, a helicopter group was created at TsAGI, which in 1928 was transformed into a section and in January 1933 into a department of special designs, whose tasks were theoretical and experimental studies of various variants of helicopter schemes and their main elements. cops, design and construction of helicopters, their flight tests.

The famous aircraft designer and aviation historian V.B. Shavrov wrote about B.N. Yuriev in his monograph: “The works of B.N. Yuryev were significantly ahead of the general level of theory and practice in the field of creating helicopters at that time. He clarified the issues of the behavior of the device and its stability in various modes of flight, takeoff and landing, and gave schematic diagrams of the structural implementation of the main elements of the helicopter, especially the single-rotor scheme.”

Until 1928, Professor B.N. Yuryev, Alexey Mikhailovich Cheremukhin and Alexander Mikhailovich Isakson were his direct assistants. After the transition of B.N. Yuryev for another job, the leadership passed to A.M. Isakson. Exceptional merits in the management of design work and

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conducting all flight tests and research by Professor A.M. Cheremukhin (since 1938 he worked in the Design Bureau of A.N. Tupolev; since 1953 - deputy general designer), who at the same time was a test pilot of all helicopters developed at TsAGI.

But, despite certain achievements in this field of helicopter engineering, at that time the Soviet leadership considered the helicopter as an exotic aircraft, funding for helicopter development was scarce, so the first production helicopters in our country appeared only after the war. Abroad, the development of helicopters from the beginning of the 30s. paid more attention.

In Germany, in 1936, the Focke-Wulf company built the Ru 61 helicopter, and in the same year, the Focke-Ahgelis company tested the Gha 61 helicopter in flight. In subsequent years, this experimental machine repeatedly set records altitude, speed and range. In 1940, a military transport helicopter GA 223 Ogasye (“Dragon”) appeared, which was a conversion of a six-seat civil helicopter GA 266. Flettner developed light helicopters KI 265 and E 282, as well as a helicopter E! 339, capable of carrying 20 people. German helicopters were used during the war in the Mediterranean, Aegean and Baltic Seas to protect convoys. GI 282 was also used to search for submarines

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enemy. In 1944, an artillery spotter unit was formed as part of the Luftwaffe, which included three ÿÿ 282 and three ÿÿ 223.

The first Sikorsky K-4 NouerPu helicopter entered service with the US Air Force in 1943. It was used in the Pacific Ocean for communications, reconnaissance and rescue operations, in particular, to rescue the wounded from the jungle in Burma. In the British Air Force, the K-4 was used to calibrate radars. Then, the Sikorsky K-5 helicopter, designed for rescue purposes, entered service with the US Air Force. It was used until the end of the war.

TsAGI 1-EA

The first experimental apparatus 1-EA was built at the Experimental Design Plant (ZOK) of TsAGI under the direction of A.M. Cheremukhin in August 1930. He represented

combat single-rotor single-seat helicopter, in which the ractive moment was balanced with the help of four tail rotors. The power plant consisted of two M-2 engines. The fuselage was a truss structure made of steel pipes and had no skin for ease of maintenance.

Tests of the 1-EA helicopter were carried out from 1930 to 1934. Already in September 1930, A.M. Cheremukhin freely maneuvered in a helicopter at 10–15 m from the ground, and in late autumn he flew at an altitude of 40–50 m. In 1932, an altitude of 100 m was reached with a flight duration of 12 minutes. In flight August 14, 1932 A.M. Cheremukhin reached a height of 605 m. This result was a record, since the official world record for flight altitude, which had belonged to the Italian Ascanio helicopter since 1928, was only 18 m. At the time, the USSR was not yet a member of the International Aviation Federation (FAI). By the way, in 1936 the world record for the altitude of the Breguet-Doran helicopter flight was registered, which was only 190 m.

Characteristics of 1-EA: crew - 1 person, power plant - 2 x M-2 with a capacity of 120 hp. s., main rotor diameter - 11.0 m, take-off weight - 1145 kg, maximum speed - 30 km/h, static ceiling - 605 m.

TsAGI 3-EA/5-EA

In 1933, the second copy of TsAGI 1-ZA was built, the design of which, based on the results of tests of the first sample, a number of changes were made. The helicopter received the designation TsAGI 3-EA, was tested on a leash, but was not released for free flight, since it was decided to install a completely new design rotor on it, developed under the leadership of Ivan Pavlovich Bratukhin. This combined rotor had three large diameter blades (12.0 m) and three smaller diameter blades (7.8 m) mounted on a sleeve between the large blades. Large-diameter blades could change their overall pitch; they were intended to create lift and control its magnitude. Three blades of smaller diameter were intended for longitudinal-transverse control of the helicopter, they were connected to the swashplate. In July 1933

a new propeller was installed at TsAGI 3-EA, after which the helicopter was renamed TsAGI 5-EA. The new helicopter was subjected to comprehensive flight tests, which continued until the beginning of 1936. It was carried out under the control of A.M. Cheremukhin 26 free flights and 8 approaches. Insufficient engine life and lack of spare engines limited the duration of the helicopter test.

Characteristics 5-EA: crew - | man, power plant - 2 x M-2 with a capacity of 120 liters. s., propeller diameter - 12.0 / 7.8 m, length - 11.0 m, height - 3.15 m, empty weight - 1047 kg, take-off

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weight - 1210 kg, maximum speed - 20 km / h, static ceiling - 40 m, flight duration - 0.7 hours.

TsAGI 11-EA/11-EA PV

An experimental helicopter with a main rotor, tested on the 5-EA apparatus, and two tail rotors installed on the wing, was built according to the scheme of I.P. Bratukhin in 1936. It was larger in size and weight than the previous devices. It was equipped with a Copagogor engine, which was installed in the forward part of the fuselage. Two cockpits - an observer (front) and a pilot (rear) - were obsessed with the main rotor. The tail unit was aircraft (horizontal and vertical), there were ailerons on the wing. Their control was twofold. Since they operated only in the presence of forward speed, all helicopter-type controls were retained. Its peculiarity was in the mutual connection of the main and tail propellers, the left of which was supposed to have reverse thrust in the hover mode, and in general, in all modes, full compliance and interaction of all three propellers should be ensured by changing their pitch. The propeller pitch control mechanism operated from the steering wheel and pedals.

The helicopter was built in a single copy. In the middle of 1936, the 11-EA rotorcraft began testing; due to difficulties with control, it flew only on a leash.

Difficulties in checking, adjusting and fine-tuning various units of the 11-ZA helicopter when testing it on a leash in 1936-1938. forced to change the device. It has a wing

was replaced by large-scale welded trusses (11 m between the axes of the tail rotors instead of 8 m), three-bladed propellers with a diameter of 2.25 m by two pairs of propellers used on 1-EA and 3-EA helicopters, the main rotor blades were made all-metal and made a number of other changes. The result was a new version of the helicopter, called TsAGI 11-EA PV (propulsion version), carried out in 1938-1939. |

In October 1940, the helicopter took to the air for the first time. During the tests, it showed good stability and satisfactory handling. By the spring of 1941, the capabilities of the helicopter were basically identified, but the results achieved did not satisfy the designers. The highest flight altitude was 50 m, and the maximum horizontal speed was about 60 km/h. These indicators could have been much higher, since the helicopter had good controllability and satisfactory stability, but further flights had to be stopped due to engine wear. The war began, and during the evacuation of TsAGI, the 11-EA PV helicopter was dismantled.

Characteristics of 11-EA: crew - 2 people, power plant - 1 x Sopachegog with a capacity of 630 liters. s., rotor diameter - 15.4 m, wingspan 10.6 m and its area - 11.3 m ?, length - 8.5 m, height - 3.5 m, take-off weight - 2600 kg, static ceiling - 40 m.

Characteristics of 11-EA PV: crew - 2 people, power plant - | x Copagog with a capacity of 630 liters. s., rotor diameter - 15.4 m, wing span - 11.2 m and its area - 11.3 m?, length - 8.5 m, height - 3.5 m, take-off weight - 2250 kg, maximum speed — 60 km/h, static ceiling — 50 m.

"Omega"

In January 1940, OKB-3 was organized at the MAI, headed by Professor B.N. Yuriev, and then I.P. Bratukhin, who transferred from TsAGI. OKB-3 developed and in 1941 built the Omega transverse helicopter. This machine had a fuselage welded from pipes and sheathed with fabric; the cockpit of the pilot and observer was located in the bow. Farms were attached to the fuselage, at the ends of which were tired

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novleny engines that rotated three-bladed rotors. In August 1941, Omega was handed over for factory tests, during which the device first flew on a leash, and then in free flight.

However, in connection with the evacuation of the MAI, the tests were interrupted, the helicopter was dismantled and sent to Alma Ata. There, in the summer of 1943, flight tests resumed. In conditions of high air temperatures, reaching up to +50 °C, due to overheating, the power of the MV-6 engines decreased and, as a result, the thrust of the rotors decreased. Therefore, with a flight weight of 2050 kg, it was possible to achieve a speed of 115 km/h and an altitude of 150 m, while according to calculations, these parameters were expected to be at least 186 km/h and 2900 m, respectively. Nevertheless, short-term flights made it possible to draw the main conclusion: the helicopter is stable in all tested flight modes, and its control is simple and reliable. According to the test results, it was recommended to replace the MV-6 engines wit powerful engines.

After returning from evacuation in 1944, OKB-3 developed a modernized version of the machine, which received the designation Omega P. Unlike the previous machine, it had more powerful MG-31F engines with new motor mounts and gearboxes. The side trusses were modified, but the diameter of the rotors remained the same. Factory tests were carried out for five months, starting in September 1944. During the tests, it was possible to raise the static ceiling, but the high level of vibration of the structure, which had to be fought for a long time, finally forced to stop testing.

The Main Artillery Directorate (GAU) of the Ministry of Defense showed interest in Omega, whose specialists suggested using the vehicle as an artillery spotter. Flight studies of the Omega II continued, and they ended at the end of 1946 after the MG-31F engines ran out of service.

Characteristics of the "Omega": crew - 2 people, power plant - 2 x MV-6 with a capacity of 220 liters each. s., rotor diameter — 7.0 m, length — 8.2 m, width — 14.2 m, empty weight — 1760 kg, takeoff weight — 2050 kg, maximum speed — 186 km/h, range — 250 km, practical ceiling - 700 m, static ceiling - 290 m.

G-3

In 1945, two machines similar to the Omega were built under the designation G-3 "Artillery fire spotter", and equipped with Rga-UÿiIpeu K-985 AM-1 engines purchased in the USA. Tests of the first G-3 machine began only in the spring of 1946. According to the results of the tests, the GAU ordered 200 G-3 machines, the government task was to produce the first eight machines by February 1947. In May-June 1947, seven serial G-3s began testing (the eighth machine did not have enough engines). In the summer of 1947, the Air Force command decided to organize the first helicopter unit in the USSR on the basis of the G-3, which was based in the city of Serpukhov near Moscow.

Characteristics of the G-3: crew - 2 people, power plant - 2 x Rgai-UPileu K-985 AM-] with a capacity of 450 hp each. s., rotor diameter — 7.0 m, length — 8.2 m, width — 14.2 m, empty weight — 2195 kg, takeoff weight — 2600 kg, maximum speed — 170 km/h, range — 233 km, practical ceiling - 2500 m, static ceiling - 1400 m.

Electric helicopters A.G. Iosifyan

In the early 30s. Andronik Gevondovich Iosifyan, later an academician, worked on the creation of an electric helicopter, a helicopter driven by electric motors from a current source located on the ground or on the device itself.

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In 1933-1935. he built a model of an “electric helicopter” of a coaxial circuit with the following parameters: the diameter of the coaxial propellers is 1.8 m, the take-off weight of the model is 28 kg; cue cable. Comprehensive tests were carried out, which made it possible to move on to a larger model of the same scheme with a propeller diameter of 6 m and with an electric motor with a power of about 30 kW. But this model could not lift a person yet.

At the beginning of 1937, a model of a tethered electric helicoplane with a three-blade main momentless propeller with a diameter of 11 m was built. At the ends of the blades there were electric motors with a power of 8 kW and a weight of 8.3 kg with pulling propellers with a diameter of 0.4 m. bearing screw was

about 75 per minute, the takeoff weight of the model with the pilot is 320 kg. In May-June 1937, ground tests were carried out, and on June 8-9, flights to a height of up to 1 m. the vibration of the bushing and the sharp jerking of the control knob began. During the tests, the model broke down during landing, so the test program could not be completed.

In 1941, work was done on the alteration of the TsAGI 5-EA helicopter, which consisted in replacing the M-2 piston engines with two especially lightweight electric motors with a power of 200 hp each. with., built specifically for this purpose, and in a partial alteration of the main gearbox. The electric motors were powered by a special mobile power station through a flexible armored cable of great length. In mid-1941, tests began. A number of flights to a height of several meters and flights in a small circle were performed. With the outbreak of war, work on a tethered helicopter was discontinued and has not been resumed.

Disk helicopter B.N. Yurieva

In 1921 B.N. Yuryev was the first in the world to propose a schematic diagram of a helicopter with a disk-shaped body. The schemes of his two vehicles are known, which were axially metric bodies with an internal arrangement of engines and propellers along the vertical axis, which sucked in air through an air intake located on the axis from above and, together with the engine exhaust, threw it down, under the vehicle, creating jet stream below him. Inside the hull was a compartment for the crew. Of course, the low-power aircraft engines available at that time were only capable of creating an air cushion under the apparatus. In our country, devices of a similar design on the eve and during the war were considered exotic, so work in the field of creating disk-like devices was not funded. |

A completely different picture was observed in Germany in the late 1930s and early 1940s, where the idea of creating disk-like aircraft was first picked up by individual enthusiasts, and then work began in some firms. With the advent of high-power piston and then jet engines among the Germans

In the 1970s, research work began on the creation of vertically taking off disc-shaped aircraft - disc gyroplanes and disc helicopters (with an external or internal rotor), which were supposed to be used as attack aircraft. All these works were carried out in the strictest secrecy.

It must be said right away that there is no documentary confirmation of which devices were developed in Germany, and even more so, what characteristics the devices had, in the open press does not exist. Perhaps some documents have been preserved, but they are still classified. All the information below is based only on information gleaned from publications in magazines, newspapers or from the memoirs of witnesses who survived the war (D. Belluzzo, H.

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Hartmann, G. Klein, R. Luzar, F. Philipp, H. Fister, G. Fleissner, E. Hulik, R. Schriver, A. Epp, etc.).

At the end of the war, at an enterprise owned by the VMU (Bayerivshy Moygepmegke) company, located not far from Prague, work was carried out on a disk-shaped apparatus E!uskre1se] ("Flying Top"). This apparatus was supposed to be equipped with five VMU 003 turbojet engines: three engines were located on the rim of the main rotor to rotate it and create lift, two engines were mounted in the lower part of the apparatus body on its sides to create horizontal thrust. By the autumn of 1944, the tests of the third prototype, which was a jet helicopter with a torqueless rotor, were over, but the characteristics of the device turned out to be unsatisfactory, since it only flew at low altitude and was unstable in the air.

The final version of H/izKre1$e] was the seventh prototype U7, designed for a crew of 2-3 people. The device, which is also called the “Schriver-Habermohl disk”, had a body 3.6 m in diameter and 3.2 m high with a hemispherical glazed cabin at the top, a supporting multi-blade rotor with a diameter of 14.4 m rotated around the body. hull, which could rotate around a vertical axis, two marching turbojet engines with deflecting deflectors were attached to the sides. The main rotor was driven by a ramjet mounted on its outer rim. The takeoff of the apparatus was carried out by the initial spin-up of the rotor by the exhaust jets of the march deflectors.

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out turbojet engine. When the rotor reached a certain number of revolutions, the ramjet engine began to work, and the deflectors of the propulsion engines turned to a horizontal position. The magnitude of the lifting force was regulated by changing the angle of installation of the rotor blades, the horizontal flight was carried out with the help of sustainer engines. The directional control of the apparatus was carried out by turning the lower part of the body with the turbojet engine in one direction or another. The prototype of the latest version of the apparatus began testing in January-February 1945 at the Prague-Kbele airfield. Work on the project continued until April 15, 1945, when Soviet troops were already approaching Prague, so the Germans destroyed the prototype GishekKteisei before retreating.

In parallel, the VMU company was developing other types of disk devices. Work began in 1943 with a prototype of the VMUU Eshre!gad I (“Flying Wheel”), which was a single-seat jet autogyro. Structurally ESHRE! the reptile had a central body, in which the cockpit was located, closed by a hemispherical dome, the body of the device was surrounded by a non-dry rotor with a diameter of 6 m with 16 blades of a variable installation angle. Under the rotor in the lower part of the body there was a VMU 003 turbojet engine with a jet deflector, fuel tanks and a four-wheel chassis without brakes and shock absorbers. The first flight of the device, weighing 3000 kg, was performed at the airfield in Prague-Kbele in August-September 1943. The device left the hangar under its own power, after which the rotor began to spin with the help of the engine deflector. Having risen to a height of 1 m, the autogyro flew about 300 m and made a hard landing.

In 1944, work began on the second prototype of the first version, which received the designation ESHregad 1 U2. This time the cockpit was enlarged to accommodate two pilots, and a keel with a rudder was installed behind the cockpit. The fixed landing gear has been replaced by a semi-retractable landing gear. The rotor diameter increased to 8 m, but the number of blades remained the same - 16. This machine was painted yellow and made its first flight in the late autumn of 1944 at the Neubiberg airfield near the VMM plant. Serious stability problems plagued the car, and the rudder was useless. In 1945, the first prototype of the second version of the device was built,

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received the designation VMUU Gÿygeÿtai P Uÿ, which retained the same hull, but rejected the failed rudder. The disc rotor was increased to 12.6 m. The first test flight of the device took place at the Prague-Kbele airfield in February 1945, while the device did not actually fly, but only made a run with a jump to a small height.

The second prototype of this version, VMUU Gÿygeÿgay P U2, first took off in April 1945. The device had a cabin for a crew of four, the rotor diameter increased to 14.4 m, and the number of blades increased to 24. The power plant consisted of two turbojet engines VMUU 003, located in the lower part of the body side by side. The third prototype, VMUU Gÿygeitaa P UZ, was at the stage of completion of development and differed from the second sample of this version by the presence of 21 blades in the rotor. Before the end of the war, they managed to start designing a gyroplane of the third version - VMM / Eshregad Sh. The device had a cabin for a crew of 6 people, the rotor diameter was 24 m, the number of blades was increased to 32. The power plant consisted of two VMM 018 turbojet engines (one engine on top above the rotor, the other under the rotor) with two jet nozzles for each engine, the landing gear was made retractable. However, all work stopped with the approach of Soviet troops to Prague. All prototypes and documentation were destroyed by special SS teams during the retreat.

In the summer of 1944, another version of the disk apparatus was being developed. The device was designed for a crew of 2-3 people and had a round body with a diameter of 18-21 m without any moving parts outside. Vertical thrust was created by a large screw driven by an engine mounted along the axis of the vehicle. Small jet engines were installed along the perimeter of the disk inside the case, the nozzles of which could rotate 90" (from vertical to horizontal), providing control of the device in flight. According to some witnesses, the prototype of the last version of the device took off on February 14, 1945. at the airfield in Prague-Kbele, when Soviet troops approached Prague, it was destroyed

SS men.

Disk devices were also developed at the Rocket Center in Peenemünde, one of the works was carried out under the direct supervision of G. Goering, for whom this machine was intended. Components and assemblies for the machine

were secretly made in various regions of Germany, assembly and testing were carried out in Peenemünde. The disc remained there until he was called to Berlin. The last flight of the device took place on April 24, 1945 in Berlin-Lichtenfeld, its further fate is unknown.

The fact that secret development of disk devices was carried out in Peenemünde is confirmed by the post-war testimony of a former prisoner of the concentration camp. In September 1943, this man, while doing construction work with other prisoners near the airstrip in the Luftwaffe's area of responsibility in Peenemünde, became an accidental witness to the testing of an unusual apparatus. According to him, four people rolled out of the hangar onto a concrete strip of a strange-looking machine. It was round in shape, had a teardrop-shaped cabin in the center and stood on small inflatable wheels, like an upside-down bathtub. After the signal was given, this silver-coloured craft began to emit a hissing sound and then took off, a couple at a height of approximately 5 m directly above the runway. Suddenly, the apparatus jumped sharply and began to gain altitude along a disorderly trajectory. At some point, a gust of wind from the Baltic Sea turned the apparatus upside down, it fell to the ground and caught fire, the pilot died.

By the end of the war, the Focke-Wulf company was developing a disk attack helicopter Yem 500. Under the cabin, along the perimeter of the apparatus, a supporting rotor was installed, which was a power ring with blades fixed on it. The rotor was driven by small ramjet engines (Pabst engines) mounted on a ring. For horizontal flight, the turbojet engines installed in the body of the apparatus were intended, two air intakes were located in the front part of the body in its upper and lower parts. At the rear of the housing under the rotor

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there was a rotary deflector of the turbojet engine, with the help of which, during takeoff, the rotor was spun before the ramjet engine began to work. It was supposed to equip the attack aircraft with six MK 213 guns, four K100V5 missiles and an automatic OBegop system for firing upwards. There is no information about the further fate of the development, in the literature there is only a mention that supposedly such a device was seen in the last month of the war taking off from a shelter in the Forest near the Berlin-Hamburg highway.

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In the technical department of the SS E-ÿU, which included the occult societies "Thule" and "Vril", until the very end of the war, the development of disk devices of the Naspebi and Vril series was carried out. As soon as Germany was occupied by the Allied troops, all evidence of the existence of the developments of the Vril and Gule societies were destroyed. Note that in England before the war, a special “Occult Bureau” was formed as part of MI5 intelligence, which was engaged in collecting information about the activities of mystical societies in various countries. After the outbreak of the war, the "Occult Bureau" formed a special group of commandos M / ha in ("Ghosts") to conduct operations in Germany. Nothing is known about the specific operations of this group, but there is an assumption that the British captured most of the documentation of 55 E-IV, which the Germans did not have time to destroy before surrendering.

Thus, the ideas of B.N. Yuryev underlie a numerous class of disk-shaped vertically taking off vehicles, which ufologists call "flying saucers".

7. GYPOS

The autogyro was invented and built in 1920 by the Spanish engineer Juan de la Sierva. Following the first C-20 model, H. Sierva flew a number of experimental gyroplanes, and in 1928 he made the first flight from Paris to London on a C-8 gyroplane. Then he organized a company in England for the production of gyroplanes for various purposes. The military immediately became interested in these rotorcraft, which could be used for various purposes: reconnaissance, fire correction, communications, aerial photography, submarine search, ship security, patrol and rescue service.

In the USSR, the first autogyro KASKR-I was built in 1929 by engineers N.I. Kamov and N.K. Skrzhinsky. After that, over the course of ten years, we created 15 types and modifications of gyroplanes, mostly built at TsAGI. Autogyro A-7 took part in the fighting of the Great Patriotic War.

In Germany, Heinrich Focke, one of the founders of the Focke-Wulf company, built the Ru 186 gyroplane in 1936. In the same year, a prototype two-seat gyroplane E was tested! 184 Anthony Flettner, intended for the fleet as a reconnaissance and anti-submarine vehicle, the next was the prototype of the EI 185 autogyro.

Before the war, the Air Forces of England and France were equipped with gyroplanes. Five C-40s successfully operated as communications vehicles with the British Expeditionary Force in France, but all of them were lost during the evacuation

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mission from Dunkirk in 1940. The remaining C-30s in England were mobilized to calibrate radars. Formed for this purpose, a separate autogyro squadron of fifteen C-30s survived until the end of the war. During the war in England, a single-seat autogyro "Rotachute" was developed, intended to ensure accurate landing of special military units.

By May 10, 1940, when the Wehrmacht units crossed the French border, the French army had 52 Geo S-30 gyroplanes (licensed version) and the fleet had eight more vehicles. Some

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French S-30s patrolled the English Channel until the end of May 1940.

In Japan, in 1941, the Ka-1 two-seat autogyro, developed by the Kayaba company on the basis of the American civil autogyro Kee KO-GA, entered service. Ka-1 was used for communications and coastal anti-submarine patrols.

KASKR-1

The gyroplane was built in the fall of 1929 under the leadership of Nikolai Ilyich Kamov and Nikolai Kirillovich Skrzhinsky; it received the designation KASKR-I (KAmov-SKRzhinsky). Outwardly, it resembled the Sierva C-8 gyroplane; its design was based on the fuselage of the U-| with tail. An M-2 engine with a capacity of 120 hp was used as a power plant. With.

In this first gyroplane in the USSR, its authors had to face many difficulties and surprises. During the tests there were many improvements and alterations. It took some time to learn how to drive a gyroplane on the ground, there were breakdowns and accidents. Soon the device, without even taking off, hooded, rolled over on its back and was badly damaged.

KASKR-2

In 1930, the damaged apparatus KASKR-I was restored, a more powerful Gnome-Ron Titan engine with a power of 225 hp was installed on it. With. The modernized apparatus, which received the designation KASKR-2, was undergoing flight tests. In general, flight performance was satisfactory

other than the long takeoff run and the high resistance of the main rotor. Therefore, the four-blade braced-type main rotor was subsequently replaced by a three-blade one with cantilever blades, and the reduction in the take-off run was achieved by preliminary spinning of the rotor by means of a mechanical start.

TsAGI 2-ZA

In 1930, under the leadership of I.P. Bratukhin and V.A. Kuznetsov, the development of the TsAGI 2-EA experimental autogyro was started. The main task of its construction was to test the possibility of using the developed I.P. Bratukhin methods of aerodynamic calculation and balancing calculation, in checking and refining the developed strength standards, gaining design experience in creating the main units of a new type, as well as training flight technical personnel.

The autogyro 2-EA, built at the beginning of 1931, was undergoing flight tests. The spin-up of the autogyro rotor before the start was carried out with the help of a tail deflector. The first flight of the experimental machine took place on November 17, 1931. During the testing, we encountered a number of previously unknown phenomena, but after mastering the gyroplane, identifying and eliminating the main defects, we began to take flight characteristics and assess the overall flight qualities of the device. The obtained data were quite good for the first experimental vehicle: maximum speed - 160 km/h, minimum speed - 58 km/h, service ceiling - 4200 m, take-off run - 50-60 m, mileage - 2-3 m.

In terms of its qualities, it was not inferior to similar foreign devices, turned out to be successful and was transferred after test flights to the propaganda squadron named after Maxim Gorky.

TsAGI A-4

At the beginning of 1932, it was decided to build, on the basis of the TsAGI-2-ZA gyroplane, a small experimental series of a new, more advanced gyroplane, intended for experimental

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operation in parts of the Air Force. In October, a prototype gyroplane was built at the TsAGI pilot plant under the designation

A-4, on November 6, 1932, its first flight took place, and on November 30 of the same year, the first serial copy of the autogyro was tested. The flight qualities of the new gyroplane were quite high and corresponded to the calculations.

The autogyro was a two-seat apparatus with a four-blade articulated rotor, designed to be used as a messenger. Structurally, it was similar to the autogyro 2-EA, but the vertical tail was not spaced apart, the control was double. The main rotor was launched from the M-26 engine with a power of 300 hp. With. The A-4 underwent flight tests at the Air Force Research Institute in 1933. The tests were successful, after which serial copies were produced in 1934 and transferred to military units.

Characteristics of A-4: crew - 1 person, power plant - M-26 with a capacity of 300 hp. s., rotor diameter - 13.0 m, wing span - 6.73 m and its area - 6.2 m?, length - 7.22 m, height - 4.0 m, empty weight - 1065 kg, takeoff weight - 1365 kg, maximum speed - 176 km / h, practical ceiling - 4500 m, range - 230 km.

TsAGI A-6/A-8

In parallel with the design of the A-4 gyroplane by order of the Air Force under the leadership of V.A. Kuznetsov developed the A-6 gyroplane with the M-11 engine with a power of 100 hp. With. To improve the flight performance and operational qualities, it was decided to introduce a number of improvements into its design: a cantilever three-bladed rotor with mechanical untwisting, folding rotor blades and wing tips for easy storage, etc.

At the beginning of 1933, a prototype autogyro was completed. After the successful completion of factory tests at the end of 1933, the gyroplane was transferred to state tests. On state tests, after several flights, a disaster occurred. At an altitude of 600 m, when leaving the gliding mode, the rotor blades broke, and the gyroplane fell to the ground, the crew died. According to the conclusion of the emergency commission, the cause of the disaster was a sharp exit from the steep glide, which caused a strong swing of the blades, which were destroyed by hitting the upper limiter. This catastrophe undermined the confidence in the A-6, and work on this autogyro slowed down.

Even when the A-6 gyroplane was put into production, it was decided to build three devices at once so that a large amount of experimental work could be carried out. Therefore, the A-8 autogyro was a backup of the A-6 autogyro, but a number of fundamental changes were made to it: the wing did not have bends at the ends, the transverse angle U of the wing was equal to 5 °, the chassis had oil-air damping (for the first time in the USSR). On the A-8, studies were carried out on new schemes of the main rotor bushings and the effectiveness of its control by deflecting its axis was tested. This work formed the basis for the design of wingless gyroplanes. The device was released in 1933 and was used for various tests. The first flight of the A-8 took place on June 29, 1934, and on August 18, 1934, the A-8 took part in the air parade in Tushino for the first time. In subsequent years, the participation of gyroplanes in such celebrations became commonplace. In 1935, three gyroplanes took part: A-4, A-7 and A-8.

The second copy of the A-8 made its first flight on February 19, 1935. By that time, it was decided to prepare the first copy of the A-8 for a non-stop flight Moscow-Leningrad, but a few days before the departure, the gyroplane crashed. Later, it was possible to establish the cause of the accident, which consisted in low directional stability and insufficient margin of lateral control at large slip angles. Tests of the second A-8 were successful, and it was recognized that it was possible to remove the wing and proceed to testing the device in a wingless version with direct control of the inclination of the rotor hub in the transverse plane.

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TsAGI A-7

Autogyro A-7 was developed by N.I. Kamov since 1931. The A-7 was a two-seat (pilot and observer) wing-type autogyro with a three-bladed rotor and an M-22 engine with a power of 480 hp. With. The pulling screw had two blades, the pitch of which could be changed on the ground. The design of the rotor allowed the blades to be folded back, which was very valuable when transporting the A-7. The autogyro had a tricycle non-retractable landing gear with a nose wheel, and a non-retractable crutch at the rear, which protected the fuselage beam during takeoff and landing. The wheels were covered with fairings and supplied with hydraulic

ski brakes. To reduce the takeoff distance, the gyroplane was equipped with a system of mechanical rotation of the rotor from the engine.

body before takeoff.

The autogyro was armed with three 7.62 mm machine guns. The pilot had a forward PV-1 firing through the propeller, and the observer was defending the rear hemisphere from two twin DA machine guns on a ring turret. In the future, nodes appeared at the bottom of the wing for the suspension of four FAB-100 bombs and six RS-82 unguided rockets.

In April 1934, the first prototype of the A-7 was ready, in May it was transported to the airfield, where ground tests of the engine and short runs began. For the first time, the device took off on September 20, 1934, factory tests of the machine continued until December 1935. Takeoffs were carried out mainly on a wheeled chassis, but in winter they tested a gyroplane on skis. On August 18, 1935, the A-7 gyroplane was demonstrated at the aviation parade in honor of Aviation Day. In 1936, the A-7 passed state tests as a short-range reconnaissance and artillery spotter.

Then, in May 1937, the second copy of the gyroplane was launched under the designation A-7bis, in which the main rotor hub was mounted not on a pyramid (which turned out to be inconvenient for the pilot), but on a thick rack with two bracing tapes, as in autogyro A-8. Other design improvements were made to the A-7bis gyroplane. In 1937, he successfully passed state tests, during which, for the first time in the world, a load of 750 kg was raised, a speed of 221 km / h was reached and flights over a distance of 1000 km were completed. The A-7bis completed the test program in July 1938. The results of its flights basically repeated the characteristics of the A-7.

At the beginning of 1938, to remove the group of I.D. Papanin from a drifting ice floe off the coast of Greenland, among other rescue equipment, decided to use the A-7 autogyro. The deadlines were tight, and within five days the A-7bis was urgently refitted to carry two people in the rear cockpit. The autogyro with spare parts was sent by rail with subsequent loading onto the Yermak icebreaker. However, the autogyro did not have a chance to fly in the Arctic, since two hydrographic vessels that left earlier, outstripped the Yermak and removed the Papanin crew from the ice floe.

In 1939, the A-7 bis and A-7 gyroplanes took part in the Soviet-Finnish war. Before the assault on the city of Vyborg, these devices took part in several reconnaissance operations.

Since the A-7 was originally conceived as a full-fledged combat vehicle, after successful tests, it was decided to build a small military series in the version of a reconnaissance and spotter. In the middle of 1940, the construction of five A-7-Za military gyroplanes began. Military pilots were trained on these machines. In one of the sorties, a curious incident occurred. The pilot, when approaching the factory airfield, did not calculate the distance and landed on the roof of one of the buildings. Fortunately, the pilots survived, and the autogyro returned to flying after repairs. One copy of A-7 in 1941 participated in an expedition to Central Asia, where he sprayed arrays of fertile trees with pesticides.

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With the outbreak of World War II, a separate gyroplane squadron was formed from five A-7-Zas as part of the 24th Army. This squadron in August 1941 operated in the area of the city of Yelnya, correcting the fire of our artillery and flying behind enemy lines to the partisans. The flights were carried out both during the day and at night. Also, during night operations, leaflets were dropped across the A-7-3a front line on enemy positions. However, there was a problem of using these autogyros at the front. The fact is that because of the blades it was difficult to disguise the apparatus. However, it had sufficiently strong armor that could withstand the shelling of large-caliber machine guns. Thus, one of the gyroplanes, despite serious damage to the fuselage, empennage and blades, was able to fly safely to its base and land safely.

In early October, the gyroplane squadron was relocated to the east. Two vehicles were transferred to the 43rd Army, two more vehicles from the remaining A-7-Za squadron were sent to Moscow for repairs, and the third autogyro was sent at night to the headquarters of our troops in Gzhatsk with an urgent report. The package with the report was delivered, but the machine itself was badly damaged during landing.

A-7 became the first combat gyroplane in the world, in total, about 400 copies were produced during the war years.

Characteristics of A-7: crew - 2 people, power plant - | x M-22 with a capacity of 480 liters. s., circle span - 10.4 m and its area - 14.7 m?, height - 3.88 m, empty weight - 1225 kg, take-off weight - 2300 kg, maximum speed - 221 km / h, range - 400 km, rate of climb - 160 m/min, practical ceiling - 4700 m, armament - 3 PV-I machine guns of 7.62 mm caliber and 750 kg of bombs or 6 RS-82.

TsAGI A-12

In 1934, several variants of gyroplanes were being worked out, among which the project of a single-seat gyroplane with a high-power engine attracted special attention. It was assumed that it would have a maximum speed of 300 km/h, a minimum speed of 45 km/h, a ceiling of 7,000 m, and a takeoff run of 35–45 m. A-12, the work was carried out under the supervision of N.K. Skrzhinsky. The A-12 was a single-seat, wingless autogyro powered by a 650 hp Wright Cyclone engine. With. and a three-bladed rotor with a diameter of 14 m.

In April 1936, the construction of the autogyro was completed, the first takeoff took place on May 10, and on May 27, 1936, the first flight lasting 10 minutes. After eliminating the identified deficiencies | On July 1936, the A-12 made a second flight lasting 55 minutes at an altitude of 2000 m. 43 flights were performed with a total duration of 17 hours 55 minutes, but on May 23, 1937, an accident occurred due to a failure of the rotor blades in the air due to fatigue the material of their spars, the test pilot died. After that, all work on the A-12 was finished.

Characteristics of the A-12: crew - 1 person, power plant - 1 x Wright-Cyclone with a capacity of 670 hp. s., rotor diameter - 18 m, empty weight - 1343 kg, takeoff weight - 1687 kg, maximum speed - 245 km / h, service ceiling - 5570 m.

TsAGI A-13/A-14

The A-13 two-seater connected gyroplane was a modification of the A-6 and A-8 gyroplanes. The gyroplane was equipped with an M-11 engine, the main rotor could tilt in the longitudinal direction in flight to change the balance of the machine, additional washers were installed at the ends of the stabilizer. The main rotor blades, wing and empennage were foldable, there was

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system of mechanical launch of the main rotor from the M-11 engine. A-13 was released in 1936 and successfully passed factory tests.

The second prototype A-13 was redesigned and named A-14. Its main difference from the previously produced gyroplanes was a new control scheme: the tilt of the rotor axis in the transverse plane and the elevator in the longitudinal plane. In addition, with the help of a special steering wheel, it was possible to tilt the rotor axis in the longitudinal plane, thereby ensuring the balancing of the autogyro at different alignments and in different flight modes. A-14 became the first Soviet wingless gyroplane with direct control. In terms of its size, design and weight characteristics, it corresponded to the A-13 autogyro and had the same engine. The first flight of the A-14 took place on September 17, 1935, and in 1936 the aircraft was tested in flight.

Characteristics of the A-14: crew - | man, power plant — | x M-11 with a capacity of 100 liters. s., rotor diameter - 11 m, length (without blades) - 6.17 m, empty weight - 635 kg, take-off weight - 785 kg.

TsAGI A-15

The military spotter and intelligence officer A-15, developed by Vyacheslav Aleksandrovich Kuznetsov and Mikhail Leontievich Mil, was a wingless

gyroplane with direct control, according to the scheme and design, similar to the A-14, but it was larger and equipped with the M-25V engine. He was armed with three ShKAS machine guns. The prototype was built in 1937, ground tests took place on April 20, 1937, but the crash of the A-12 gyroplane suspended the tests of the A-15. In the end, all work was stopped, and the gyroplane was mothballed.

Characteristics of the A-14: crew - 2 people, power plant - 1 x M-25 with a capacity of 700 liters. s., rotor diameter - 18 m, empty weight - 1965 kg, take-off weight - 2560 kg, maximum speed - 280 km / h, service ceiling - 6750 m.

AK

Autogyro AK (gyro-spotter) was designed in 1940 under the leadership of N.I. Kamov with the participation of M.L. Mile in OKB-3 MAI. It was a wingless autogyro with a double closed cabin (seats side by side), equipped with an MV-6 engine with an 220 horsepower. With. with push screw. The construction of the apparatus under the conditions of evacuation was not completed.

8. JET PLANES

In the 20s. aviation science began to study the possibility of using jet engines on aircraft. The jet engine found its first use as an accelerator for taking off an aircraft or for temporarily increasing its speed in flight. Such accelerators were TTU - solid propellant boosters (powder rockets), as structurally the simplest and most studied by that time. For the first time a glider equipped with powder boosters took off in Germany in 1928, in the 1930s. Work in this direction was carried out in the USSR, USA, England and other countries.

The first flight in the Soviet Union of the U-I aircraft with TTU took place in May 1931, after which studies began on the possibility of equipping the TB-1 heavy bomber with boosters. In 1933, six boosters were installed on the TB-I, three on each side of the fuselage at the split points of the wing consoles and the center section. There were two options for their placement: in the first variant, all boosters were attached to the top of the wing (aircraft Ho 614), in the second variant, one booster on top and two on the bottom (aircraft Ho 726). Completed in October 1933

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tests showed that as a result of the installation of six powder rockets, the takeoff run of the TB-1 aircraft was reduced by almost four times. In 1935-1936. I-4 and I-15 fighters were tested in order to develop TTU for a short-term and sharp increase in vehicle speed. However, TTU was not widely used in the Soviet Air Force, unlike the Luftwaffe, during the war only experiments were carried out with the installation of powder accelerators on aircraft, for example, in 1943 on the Pe-2 bomber.

In contrast to TTU, liquid-propellant rocket engines (LRE) operating on liquid propellant components (fuel and oxidizer) have become quite widespread in Soviet aviation. Work on the use of LRE began in the 30s. at the Gas Dynamic Laboratory in Leningrad and developed in two directions: application as the main engine and as an accelerator.

As the main engine, rocket engines were installed on rocket planes (according to the terminology of that time) RP-I, RP-2, RP-218 and RP-318, which were supposed to be used when flying in the stratosphere (at altitudes of 20-30 km and more). In 1941, the development of the BI-interceptor fighter began. with rocket engines, and then R-114 fighters, RP S.P. Queen, "Baby", "4302" and RM-1. As an additional booster, liquid-propellant rocket engines were used on aircraft with a propeller-driven power plant (VMPU), such as the I-4, Pe-2, La-5VI, La-7R, Su-6/Su-7, and Yak-ZRD.

At the end of the 30s. ramjet engines (ramjet engines) began to be used as accelerators. They were part of the combined power plant, where the main one was the Navy, such aircraft as IVS, I-15bis, I-153, I-207, "D", Yak-7B and LaGG-3.

In 1938, a project was developed for the country's first turbojet engine (TRD) with a thrust of 500 kgf, by the summer of 1941, the TRD was 70% ready, but in the conditions of the outbreak of war, all work on it ceased.

With the advent of mass-produced jet aircraft (Me 163, Me 262, Ag 234) among the Germans in the last years of the war, work in this direction also intensified in our country. In February 1944, the State Defense Committee decided to organize a research institute, which would concentrate all scientific and technical work on jet technology. P.I. was appointed head of the institute. Fedorov, his deputy V.F. Bolkhovitinov. This institute brought together groups of jet engine designers who previously worked at various enterprises, headed by M.M. Bondaryuk, V.P. Glushko, L.S. Dushkin, A.M. Isaev, A.M. Lyulkoy and others. The resolution obliged the People's Commissariat of the aviation industry to submit specific proposals for the construction of jet engines and jet aircraft within a month. On May 22, 1944, the GKO adopted another resolution that outlined a broad program of construction

jet aviation technology, which was based on the scientific and technical reserve created in the prewar and war years.

On the basis of the decisions made, work was launched in the Soviet Union in a short time on theoretical, experimental and experimental design studies of various directions in the development of aircraft jet engines.

Aircraft with LRE

RP-1/RP-2

In the autumn of 1933, under the leadership of Sergei Pavlovich Korolev, later the chief designer of rocket and space systems, the development of the RP-I and RP-2 rocket planes began. Rocket planes were created on the basis of a “tailless” airframe designed by B.I. Cheranovsky, but

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The RP-1 was equipped with an OR-2 LRE with a thrust of 50 kgf developed by Friedrich Arturovich Zander, and the RP-2 was equipped with a LRE RD-A with a thrust of 85 kgf designed by Mikhail Klavdievich Tikhonravov. The estimated flight duration for RP-I and RP-2 was 7 and 12 minutes, respectively. However, due to the difficulties that arose during the development of engines, work on rocket planes was stopped, but the experience gained was used in further work, in particular, in the development of the RP-218 rocket plane project.

RP-218

In 1936, under the leadership of S.P. Korolev, a project of an experimental rocket plane RP-218 was developed. The crew of two people was located in a pressurized cabin back to back, the power plant consisted of three nitrogen-kerosene engines ORD-300--2 (ORM-70) designed by Valentin Petrovich Glushko with a total thrust of 900 kgf.

Two options for launching the RP-218 were considered: an independent take-off of the rocket plane from the ground and lifting it to a certain height with the help of a TB-3 carrier aircraft or by towing with subsequent uncoupling. To facilitate takeoff from the ground, it was proposed to use solid propellant boosters with a thrust of 150 kgf on the rocket plane.

For the option of raising the rocket plane in tow A.Ya. Sherbakov proposed a new method of towing, which consisted in introducing one or more intermediate gliders between the towing aircraft and the rocket plane (“air chain method”), which made it possible to raise the rocket plane to a height of up to 10 km when the towing aircraft was flying at an altitude of 4–5 km. . The results of work on the RP-218 formed the basis for the development of the RP-318 rocket plane.

Characteristics of RP-218-1: crew - 2 people, power plant - 3 x ORD-300--2 (ORM-70) with a total thrust of 900 kgf, wing area - 7.2 m2, take-off weight - 1600 kg, maximum speed - 850 km / h, practical ceiling - 9000-25 000 m.

RP-318-1

The RP-318-1 rocket plane was created on the basis of the SK-9 airframe, which was equipped with an ORM-65 rocket engine with a thrust of 175 kgf. After ground testing of the engine for the summer of 1938, flight tests of the rocket plane were planned.

But then a wave of repressions began, the head of the RNII I.T. was arrested and shot. Kleimenov and Chief Engineer of the RNII G.E. Langemak. In March 1938, engine designer V.P. was arrested on a false denunciation. Glushko, and on June 27, 1938 - S.P. Queen.

Leading designer for RP-318-1 after the arrest of S.P. Queen was appointed A.Ya. Shcherbakov. A nitrogen-acid-kerosene engine RDA-1-150 designed by L.S. was installed on the rocket plane. Dushkin. From February 1939 to October 1939, more than 100 ground fire tests of the propulsion system took place, during which the systems of the propulsion system were tested and its characteristics were taken. In free flight, the SK-9 was tested back in January, while the tanks of the propulsion system were filled with different amounts of fuel. Despite the flight weight increased by almost 30%, the glider retained high flight qualities.

In January 1940, the rocket plane was brought to one of the airfields near Moscow, where it began to be prepared for flight. The first flight of the RP-318-1 took place on February 28, 1940 in tow behind the R-5 aircraft. At an altitude of 2800 m, the test pilot uncoupled the rocket plane from the towing vehicle, set the flight speed

80 km / h and turned on the rocket engine. The rocket glider began to quickly pick up speed and went into flight with a climb. Throughout the operation of the rocket engine, the glider behaved

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normal - no vibrations were felt. On March 10 and 19, 1940, two more successful flights took place.

Characteristics of RP-318-1: crew - 1 person, power plant - RDA-1-150 with a thrust of 100 kgf, wingspan - 17 m, its area - 22 m, length - 7.44 m, empty weight - 570 kg, takeoff weight - 700 kg, maximum speed - 160 km / h.

BI-1

In the spring of 1940, a meeting was held at which the chief aircraft designers were informed about new promising power plants with jet engines of various types, mainly with liquid-propellant and ramjet engines. Apparently, the reason for the meeting was intelligence about the existence of a German program to create a missile fighter-interceptor. After the end of the war, it became known that since January 1939, in a special "Department [" of the Messerschmitt company, where Professor A. Lippisch and his employees transferred from the German Glider Institute, work was underway on the Me 163 objective fighter-interceptor with a rocket engine . In addition to A. Lippisch, W. von Braun and E. Bachem worked on the creation of a missile interceptor.

In July 1940, the need to create a Soviet fighter-interceptor with a rocket engine was recognized by the Defense Committee under the Council of People's Commissars of the USSR. In March 1941 OKB V.F. Bolkhovitinov started developing the first domestic BI-I fighter-interceptor (short-range fighter) with a D-1A-1100 liquid-propellant rocket engine with a thrust of 1100 kgf, and already on September 15 the aircraft (without an engine) was ready for testing. Initially, the aircraft was blown through in the natural TsAGI wind tunnel, taking its aerodynamic characteristics down. Then began flight tests of the machine in a glider version in tow behind the Pe-2 aircraft.

At the end of October, work was stopped due to the evacuation of the design bureau, but resumed in February of the following year. The first flight of a prototype with the engine turned on took place on May 15, 1942 under the control of test pilot G.Ya. Bach

Chivanji, the flight as a whole was successful, but the landing gear broke during landing, and the tail section of the aircraft was damaged. In January 1943, the second experimental machine began flight tests, and then the third. G.Ya. Bakhchivandzhi died on March 27, 1943 during a crash that occurred with the third experimental aircraft.

In parallel with the testing of prototypes, in the middle of 1942, the production of a military series of aircraft under the designation BI-VS was started. These aircraft, in addition to cannon armament, carried cassettes with 10 bombs weighing 2 kg each, which were supposed to be dropped over the formation of enemy bombers. However, the aircraft of this series (30-40 copies) were scrapped after the death of G.Ya. Bahchi-vanji.

By 1944, five more experimental BI-I aircraft were manufactured, which were supposed to be tested with new, more reliable engines by A.M. Isaeva RD-1 with a thrust of 1100 kgf. On the sixth prototype aircraft, two ramjets were installed at the ends of the wing; the aircraft performed three flights with engine start in flight after the aircraft was towed to a predetermined altitude. Tests of experimental machines continued until the end of the war, but the BI-1 aircraft did not go into production.

Characteristics of the BI-1: crew - 1 person, power plant - D-1-A-1100 with a thrust of 1100 kg, wingspan - 6.48 m; its area - 7 m?, length - 6.4 m, height - 2 .06 m, empty weight - 790 kg, take-off weight - 1683 kg, maximum speed - 1020 km/h, flight duration - 15 minutes, armament - 2 ShVAK cannons of 20 mm caliber.

R-114

In 1942, under the leadership of R.L. Bartini began designing a single-seat anti-aircraft fighter-interceptor P-114, which was a “flying wing” with a large

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variable sweep of the leading edge, with two-keel vertical plumage at the ends of the wing. The power plant of the aircraft consisted of four liquid-propellant rocket engines with a thrust of 300 kgf each and a ramjet engine, and an infrared radar was supposed to be installed in the forward fuselage. During takeoff, the power plant was supposed to work as a rocket engine with air suction, and at high speeds as a ramjet engine (without oxide consumption).

litel) using fuel vapor injection. The take-off of the machine was carried out using a wheeled cart that was dropped after take-off, landing was carried out on a retractable ventral ski. The aircraft was designed for a maximum speed of 2,000 km/h, the practical ceiling was to be 24,000 m during takeoff from the ground and 40,000 m after being hit by a carrier aircraft at an altitude of 10,000 m. However, in the autumn of 1943, the Design Bureau was disbanded.

Missile interceptor S.P. Queen

At the end of 1942 S.P. Korolev proposed a project for a missile interceptor with an RD-1 engine. In addition to the tasks of intercepting enemy bombers, the aircraft could also be used to attack ground targets - tanks, artillery batteries, enemy anti-aircraft points, crossings, etc. However, the project was not implemented, since at that time work was already underway on similar BI aircraft -1 and "302".

Characteristics of the missile interceptor (second option): crew - 1 person, power plant - RD-1 with a thrust of 1200 kgf, wingspan - 7.2 m and its area - 13.0 m?, length - 7.35 m, height - 2.3 m, take-off weight - 2500 kg, maximum speed - 1000 km/h, service ceiling - 20,000 m, maximum flight duration - 30 minutes, armament - 2 VA guns caliber 23 mm, 1 VS machine gun and 6 RS-82.

"Baby"

In the autumn of 1943, under the leadership of N.N. Polikarpov, the development of the Malyutka high-altitude jet fighter-interceptor with the RD-2M-2 liquid-propellant rocket engine began. The fighter had to carry two 23 mm cannons as armament. However, with the death of N.N. Polikarpov's work on this aircraft was finished.

Characteristics of the "Malyutka": crew - 1 person, power plant - RD-2M with a thrust of 1100 kgf, wingspan - 7.5 m and its area - 8 m, length - 7.0 m, empty weight - 1016 kg , takeoff weight - 2795 kg, maximum speed - 890 km / h, climb time 5000 m - | minute, practical ceiling — 16,000 m.

"4302" |

In the summer of 1944, under the leadership of I.F. Florov, work began on the 4302 aircraft with a liquid-propellant rocket engine. On the second and third prototypes of the aircraft, it was supposed to work out LRE of different designs - RD-IM A.M. Dushkin (aircraft number 3). Work on the aircraft continued even after the end of the war; only the second

experimental car.

Characteristics of the aircraft "4302" No. 2: crew - 1 person, power plant - RD-1M with a thrust of 1500 kgf, wingspan - 6.93 m and its area - 8.85 m?, length - 7.12 m, weight empty - 1016 kg, takeoff weight - 2795 kg, maximum speed - 520 km / h.

RM-1

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In 1944, under the leadership of A.S. Moskalev, the development of the supersonic fighter RM I (SAM-29) with the RD-2M-ZV liquid-propellant rocket engine began. The aircraft was made according to the “flying wing” scheme, triangular in plan with oval leading edges; during its development, pre-war experience in creating the Sigma and Strela aircraft was used. The RM-1 project was submitted to TsAGI for consideration. TsAGI believed that the construction and flight testing of the RM-I is one of the most expedient directions in the problem of the further development of aviation. At the beginning of November 1945, the order to build the RM-1 was issued. signed by Minister A.I. Shakhurin, but in early January 1946 A.I. Shakhurin was repressed, and the order to build RM-1 was canceled by A.S. Yakovlev.

Characteristics of RM-I: crew - 1 person, power plant - RD-2M-3V with a thrust of 1590 kgf, wingspan - 8.1 m, its area - 28.0 m, take-off weight - 1600 kg, maximum speed - 2200 km/h

Aircraft with naval forces and an additional rocket engine

I-4

In parallel with the development of the direction of using LRE as the main engine of an aircraft, studies were carried out on the possibility of using LRE as an auxiliary booster engine for use on an aircraft.

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Takh with propeller power plant. In 1933, on the instructions of the Air Force of the Red Army, these works were carried out at the Gas Dynamics Laboratory in relation to the I-4 fighter. It was supposed to install under the wings of the aircraft one ORM-52 with a thrust of 300 kgf on each side of the fuselage. The stock of fuel (nitric acid - kerosene) in the amount of 120 kg was enough to run the engines for one minute.

Pe-2

In August 1943, flight tests of the serial Pe-2 aircraft began with an additional RD-I engine with a thrust of 300 kgf, installed in the rear fuselage. The engine control was duplicated; it could be started either by the pilot or by the gunner-radio operator. The RD-I was switched on both on takeoff and in flight, the test results confirmed the expected improvement in the flight performance of the Pe-2 aircraft. The aircraft's maximum speed increased by 46–68 km/h, and the climb time to 5,000 m was reduced from 10 to 7 minutes. The longest duration of continuous operation of the RD-I at full thrust in flight was 10 minutes.

La-7R

In October 1944, on the serial La-7 fighter, which received the designation La-7R-1, the tail section of the fuselage was modified with the installation of an additional RD-1 engine in it. Soon a second machine was prepared under the designation La-7R-2. Flight tests began on October 27, 1944 and continued until March 27 of the following year. During the tests, the maximum aircraft speed with the RD-I turned on was 747 km/h. In July, a modified RD-1X3 engine was installed on the La-7R-2. During test flights carried out before September 16, 1945, a maximum speed of 795 km/h was reached at an altitude of 6300 m.

Su-7

In April 1944, in the OKB P.O. Sukhoi began designing an experimental modification of the Su-6 aircraft for the main engine ASh-82FN and an additional engine

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RD-I. In January 1945, flight tests of the machine began, which received the designation Su-7 No. 82G. In the summer, instead of RD-I, a more reliable RD-IKhZ was installed on the machine; tests, during which the maximum aircraft speed of 705 km/h was reached, ended on December 19. |

Yak-ZRD

In December 1944, in the design bureau of A.S. Yakovlev, an additional RD-I engine in the rear fuselage was installed on the serial Yak-3 aircraft with a VK-105PF2 engine, and the experimental aircraft received the designation Yak-ZRD. The aircraft was tested from December 22, 1944 to May 15, 1945. After the replacement of the LRE, the flights resumed, the maximum speed of 782 km/h was reached, but on August 16, during the next flight, the aircraft crashed, the test pilot died. All further work on the aircraft was prepainted.

La-5VI |

In December 1944, under the leadership of S.P. Korolev, work began on converting the serial La-5 fighter with the M-82FNV engine into the La-5VI high-altitude fighter by installing additional rocket engines on it. In the original version, three RD-I engines were installed, one in the rear fuselage, and two in the wing nacelles, behind the acid tanks. In the second version of the La-5VI aircraft, it was proposed to install a three-chamber RD-3 liquid-propellant rocket engine, the combustion chambers of which were to be installed in the same way as on the first version of the aircraft. During the tests, the following maximum speeds were recorded: for La-5VI with RD-1 — 820 km/h, for La-5VI with RD-3 — 1000 km/h.

Aircraft with naval forces and additional ramjets

IVS

In 1937, in the Department of Special Constructions (OSK) under the leadership of A.Ya; Shcherbakov, a project was developed for a high-speed fighter IVS, which, in addition to the main

engine M-120 with a capacity of 1650 liters. With. had an additional ramjet in the rear fuselage. In flight, the air for the ramjet entered it through the ventral radiator for cooling the main engine. The fuel for the ramjet was gasoline from the main fuel system, which was injected into the combustion chamber. The design characteristics of the aircraft were as follows: maximum speed without ramjet activation - 700 km/h, maximum speed with ramjet engaged - 825 km/h, service ceiling without ramjet - 14,000 m.

The variant of the IVS with only one ramjet was considered. The flight of such an aircraft was carried out by the "air chain" method, that is, in one tow with intermediate gliders behind the towing aircraft. With this method, the IVS climbed to a great height and, after uncoupling in a gliding mode, developed a speed at which the ramjet was switched on and worked steadily.

The Air Force command showed interest in the IVS project, for him, under the leadership of I.A. Merkulov, a ramjet was developed, but with the outbreak of war, all work was stopped.

I-15bis

In December 1939, USC began flight tests of the serial I-15bis fighter with two additional DM-2 ramjet engines with a thrust of 100 kgf each, installed in place of the bomb beams under the lower wing. The supply of gasoline to the DM-2 was carried out from the modified main fuel system of the aircraft. The total supply of gasoline in the system ensured the duration of the aircraft flight with short-term switching on of both DM-2s for no more than 35 minutes.

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The tests of the fighter continued until May 1940, the increase in the maximum flight speed with the ramjet in operation was 18–20 km/h.

I-153

In September 1940, USC began testing a serial I-153 fighter equipped with two additional ramjet engines under the lower wing. Average speed increase at

turning on the DM-2 in flight was about 30 km / h. In October, new DM-4 engines and a pressurized cockpit were installed on the aircraft. Flight tests have established that the I-153 aircraft, when flying at an altitude of 2000 m, with the ramjet operating, increases its maximum speed from 389 km/h to 440 km/h, that is, it increases the maximum flight speed by 51 km/h.

The test results were recognized as successful, and in January 1941 it was decided to organize an experimental base for pressurized cabins and jet engines near the Vladykino station near Moscow to carry out further design experimental work on the development of ramjet engines and its application. The construction of the experimental base began in the second quarter of 1941, but the war began, so all work in this direction was stopped.

I-207

In 1940-1941. for the third experimental aircraft I-207/3 designed by A.A. Borovkov and I.F. Florov, equipped with an M-63 engine with a capacity of 930 hp. s., installed two additional DM-4 ramjet engines, which were powered by the same gasoline as the main engine. DM-4 were installed under the lower wing in the tank suspension units. The aircraft was undergoing flight tests.

Then the project of aircraft No. 10 was developed, which had an additional ramjet installed inside the fuselage behind the cockpit; when it was turned on, it was necessary to open the air intake flaps. The calculated maximum speed was 840 km/h (with ramjet on) and 658 km/h (without ramjet on). The armament of the aircraft consisted of two machine guns of 12.7 mm caliber, two machine guns of 7.62 mm caliber and 1000 kg of bombs: Aircraft No. 10 was supposed in three versions: a high-speed maneuverable fighter, an escort fighter and a dive bomber.

The next project of aircraft No. 11 (maneuverable fighter) with the M-71 main engine provided for the installation of two DM-4s with an air intake in the side recesses of the fuselage. The armament was the same as No. 10, but it was possible to hang two cannons instead of bombs.

PTB-23 caliber 23 mm. The maximum design speed without bombs was 630 km / h. It was recommended to include the aircraft in the pilot construction plan for 1941, however, due to the negative attitude of the leadership of the aviation industry and the Air Force towards biplanes of all types, the projects had no further continuation.

"D"

In the first half of 1941 A.A. Borovkov and I.F. Florov worked on the project of the "D" aircraft with the main engine M-71 with a power of 2000 hp. With. and two additional ramjet DM-12. It was assumed that the "D" would be a promising fighter-interceptor with powerful cannon armament (two Sh-37 cannons and two ShVAK cannons). It was carried out according to the scheme of a two-beam monoplane with a pusher propeller, the wing was swept, while the beams were jet engine cases. The calculated data showed that in flight, when additional ramjet engines were switched on, the maximum speed could be 850 km/h.

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In July 1941 OKB-207 A.A. Borovkov and I.F. Florov was disbanded, some of the designers were transferred to a serial aircraft plant in Gorky, and some of the designers headed by A.A. Borovkov and I.F. Florov was transferred to OKBV.F. Bolkhovitinov to participate in work on the BI-1 aircraft.

Two years after the work on the “D” fighter was stopped, in September 1943, for the first time, a prototype of a two-beam aircraft of the “De Havilland” company O.N. took off. 100 "Vampire". It became the first British fighter with a turbojet engine and entered service with the RAF in 1946.

Yak-7B

From March 24 to December 12, 1944, the Yak-7B aircraft with the M-105PF main engine and two additional DM-4S with a thrust of 158 kgf each installed under each wing console were tested. As a result of the tests, it was found that the increase in speed does not exceed 20 km / h.

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Yak-7B early series

lagg-3

In August 1942, summer tests of the LaGG-3 aircraft with two VRD-I ramjet engines designed by Mikhail Makarovich Bondaryuk, installed under the wing, were carried out. The increase in speed in relation to the flight speed with the VRD-I turned off at an altitude of 1500 m did not exceed 15 km/h.

All work on the ramjet was practically stopped due to the end of the war and the subsequent appearance of turbojet engines, which had advantages over the ramjet in thrust.

Aircraft with naval forces and additional VRDK

TsAGI studies have shown that at speeds of 400-500 km/h the ramjet is inefficient and has a small amount of developed thrust due to the low total pressure at the inlet. It was possible to increase the pressure; for example, by using a compressor having a separate drive, the so-called coil pressor engine or a compressor-type air-jet engine (VRDC).

The idea of a motor-compressor engine belongs to our compatriot engineer Gorokhov, and a little later, independently of him, the same idea was expressed by the French engineer Rene Loren, who in 1908 proposed the design of his engine. In 1910, the Romanian aviator and inventor Henri Coanda built an aircraft with a VRDK with a thrust of 220 kgf, the compressor of which was driven by a Clerje engine with a power of 50 hp. With. On the eve of the Second World War, aircraft with the Caproni-Campini VRDK S.S.2 / M. [and

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Caproni-Campini S.S.7 Tozkapa, during the war the Reggiana Ke.2005K fighter and the Caproni Ca interceptor fighter were developed. 183615.

In 1941-1943. TsAGI developed several projects of aircraft with VRDK: single-engine aircraft S-ÿVRDK-I with M-82 as a compressor drive, twin-engine aircraft S-2VRDK-1 with AM-39F as a drive for both compressors, Yak- EVRDK with M-105 and La-5VRDK. However, none of these projects came to fruition.

I-250 (MiG-13)

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In May 1944, OKB A.I. Mikoyan received an assignment to develop the I-250 fighter with a combined propulsion system as part of the VK-107A and VRDK. The design of the I-250 was completed by the end of November 1944, and in February 1945 it was already prepared for flight testing experimental machine.

The VK-107R engine with a three-bladed propeller was located in the forward part of the aircraft fuselage. It was a modification of the serial VK-107A motor with a gearbox for power take-off for rotation of the VRDC compressor designed by K.V. Kholshchevnikov. The combustion chamber of the VRDK was located behind the cockpit and ended in the rear fuselage with a jet nozzle with adjustable flaps. The armament of the fighter included three B-20 guns of 20 mm caliber.

The first flight of the I-250 took place on March 3, 1945. In further tests, the maximum flight speed of 825 km/h was achieved, the increase in speed when the VRDC was turned on was almost 150 km/h. The I-250 aircraft climbed an altitude of 5,000 m in 3.9 minutes (with the VRDK on) and in 4.6 minutes (with it off), the practical ceiling was 11,900 m (without the use of the VRDK - 10,500 m). Unfortunately, in one of the flights with the first experimental machine, a catastrophe occurred due to the destruction of the stabilizer, and the test pilot died. After the disaster, the tests were continued on the second experimental machine, which had an increased vertical tail area and a modified tail wheel retraction scheme. Based on the results of testing the second machine in July 1945, a decision was made to launch the I-250 aircraft into serial production.

_ In May 1948, the I-250 was put into service under the designation MiG-13, a small the number of aircraft entered the aviation regiments of the Northern and Baltic fleets. In 1950, the MiG-13 aircraft were withdrawn from service, as mass production of much more advanced fighters with turbojet engines had already begun in the USSR.

Su-5 (I-107)

In January 1944, in the OKB P.O. Sukhoi started designing a single-seat fighter with a combined power plant. The project was carried out in two variants.

In the first version, the power plant consisted of the M-107A main piston engine with a propeller and an additional VRDK, which served as an accelerator, the compressor was driven by the M-107A engine using two shafts and an intermediate gearbox. The air intake for the VRDK was carried out by two air intakes located in the toes of the center section of the wing. Compressed air entered the front part of the combustion chamber with nozzles installed in it. The rear part of the combustion chamber passed into an unregulated jet nozzle. In the second version, the power plant of the fighter consisted of the M-107A and the VRDK, the air intake of which was located under the spinner of the propeller of the M 1074 engine. |

At the beginning of June 1944, the design bureau began designing the aircraft, which initially received the designation I-107, and already in the process of factory flight tests, it was given the designation Su-5. The second version of the draft design of a single-seat fighter with M-107A and VRDK was taken as a basis. The aircraft was equipped with a 23 mm H-23 cannon and two 12.7 mm UBS machine guns.

Due to the unavailability of the power plant, the flight prototype of the aircraft was handed over for testing only on March 24, 1945. The first flight of a prototype Su-5 fighter took place on April 6, flight tests ended on October 18. In the process of testing, it turned out that the real speed characteristics of the aircraft are lower than the calculated ones. At the end of November 1946, all work on the Su-5 was finished.

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Aircraft with a combined ramjet and rocket engine power plant

Yak-7R

In OKB A.S. Yakovlev on the basis of the Yak-7 aircraft in 1942, the Yak-7R (jet) interceptor fighter was developed. The aircraft was equipped with a combined power plant consisting of two DM-4S ramjet engines located under the wing and one D-1-A-1100 ramjet engine in the rear fuselage. The LRE was intended for short-term use during takeoff and acceleration, after which the main ramjet was launched. The fuel for the DM-4S was gasoline from wing tanks, the D-1-A-1100 used kerosene as fuel, and nitric acid as an oxidizer. The armament of the aircraft consisted of two UBS machine guns in the forward fuselage. The design was completed on August 27, 1942, but the project was not implemented due to the lack of serial ramjet engines reliable in operation at that time.

Aircraft "302" R

In the middle of 1940, under the leadership of A.G. Kostikov began the development of a single-seat fighter, which received the designation "302". The aircraft was supposed to be equipped with a combined power plant consisting of two mid-flight ramjet engines designed by V.S. Zuev under the wing consoles and the starting, or upper stage, RD-1400 liquid-propellant rocket engine designed by L.S. Dushkin with a maximum thrust of 1400 kgf, installed in the rear fuselage. It was assumed that the 302 aircraft would develop a maximum speed of 900 km/h, have a practical ceiling of 9000 m and reach it in 2 minutes. Four ShVAK cannons were located in the forward fuselage. In addition, the suspension under the wing of RS-82 or RS-132 rockets was supposed; for operations on ground targets, the aircraft could be equipped with two bombs up to 125 kg.

The project of the aircraft "302" was completed in the spring of 1941, after the outbreak of war, all work on it was suspended. Only by the end of 1942 was it decided to resume work on the 302 aircraft. By the spring of 1943, it turned out that the ramjet had not yet been manufactured, and the rocket engine had just begun firing tests. For this reason, at the end of August 1943, the aircraft in the glider version, which received the designation "3021", entered service.

tanya in LII. There he made several dozen flights in tow behind Tu-2 and V-25 aircraft.

At the beginning of 1944, the second copy of the 302P aircraft was tested in the full-scale wind tunnel of TsAGI and was ready to fly with only one rocket engine (without installing a ramjet engine), but the state commission, headed by A.S. Yakovlev, decided to abandon the production of the 302 aircraft. This was motivated by the presence of a small series of BI aircraft, as well as the lack of need for front-line aviation and air defense aviation in a missile interceptor with a short range.

Characteristics of the 302P: crew - 1 person, power plant - 1 x RD-1400 with a thrust of 1400 kgf, wingspan - 9.55 m and its area - 14.8 mg, length - 8.77 m, empty weight - 1856 kg, takeoff weight - 3358 kg, maximum speed - 900 km/h, range - 100 km, service ceiling - 9000 m, climb time - 9000 m - 2 minutes, armament - 4 ShVAK guns of caliber 20 mm, 2 RS-82 or 2 RS-132 or 2 FAB-125 bombs.

Aircraft with turbojet engines

KhAI-2

In 1936, a student of the Kharkov Aviation Institute (KhAI) A.P. Eremenko (later professor and rector of KhAI) on his own initiative developed a project for a light single-seat aircraft KhAI-2 for a turbojet engine RTD-1 with a thrust of 500 kgf, which was designed by Arkhip Mikhailovich Lyulka, engineer of the department of thermal engines of KhAI, subsequently

academician.

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The engine with a centrifugal compressor was located behind the cockpit with a nozzle exit under the rear fuselage, the air intake was under the fuselage. The aircraft had the following characteristics: length - 7.15 m, wingspan - 7.0 m, takeoff weight - 1500 kg, maximum speed - 500 km/h. The project was not implemented.

LaGG-ZRD-1/Gu-VRD

In October 1942 M.I. Gudkov got acquainted in the NKAP with the drawings of the RD-I engine developed by A.M. Cradles. RD-I with a six-stage axial compressor was a

operation of the original RTD-1 engine. Work on RD-! was carried out in SKB-I at the Kirov Plant in Leningrad with the involvement of designers from the Central Boiler and Turbine Institute named after I.I. Polzunov. By August 1941, the RD-I was 75% ready, but work on the turbojet engine stopped due to evacuation.

M.I. Gudkov proposed to develop a project for a jet aircraft based on the serial LaGG-3 fighter using the unfinished RD-1 engine. The aircraft project was carried out in two versions according to the redone scheme, as well as KhAI-2.

The first version of the LaGG-ZRD-| It was equipped with an RD-1 engine with a thrust of 530 kgf in the forward part of the fuselage in front of the cockpit with the air intake inlet mixing down from the longitudinal axis of the original LaGG-3 aircraft. The aircraft had a length of 9.0 m, a wingspan of 10.5 m and a maximum speed of 500 km/h. |

The second version, Gu-VRD, had a modified RD-1 engine with a thrust of 750 kgf under the cockpit, and the air intake inlet consisted of four holes in the pointed nose of the fuselage.

In April 1943, the LaGG-ZRD-1 and Gu-VRD projects were considered at the Air Force Research Institute, but in the end they were rejected due to engine defects.

Characteristics of Gu-VRD: crew - | man, power plant -- | x RD-I with a thrust of 750 kgf, wing span - 10.5 m and its area - 11.0 m?, length - 9.9 m, height - 2.95 m, takeoff weight - 2250 kg, maximum speed - 900 km / h, flight range - 700 km, weapons - | 20 mm cannon and 1 12.7 mm machine gun.

La WRD

In May 1944, a government decree was issued on the design in the OKB S.A. Lavochkin jet fighter under the C-18 A.M. The cradle, which was a further development of the RD-1. The development of the aircraft, which received the designation La-VRD, was carried out under the leadership of S.A. Alekseev.

La-VRD was a two-beam, two-keel aircraft with side air intakes, a three-wheel landing gear (the front wheel was retracted behind the pilot's armored back, and

the main racks folded back at the junction of the beams with the wing). The aircraft was armed with two 23 mm cannons in the wing beams. By November 1, 1944, the preliminary design was completed, but due to the unavailability of the La-VRD engine, it did not go into production.

Characteristics of the La-VRD: crew - 1 person, power plant - 1 x S-18 with a thrust of 1250 kgf, wingspan - 9.6 m and its area - 15.5 m?, length - 9.9 m, weight empty - 2640 kg, take-off weight - 3300 kg, maximum speed - 890 km/h, service ceiling - 15,000 m, rate of climb - 2000 m/min, armament - 2 cannons of 23 mm caliber.

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9. PLANES-SHELLS

The development of projectile aircraft began even at the dawn of the development of aviation, according to the terminology. At that time, this type of aircraft was called aircraft torpedoes. In 1910-1911. Frenchman R. Lauren developed the project of the world's first projectile aircraft.

During the First World War, the development of aircraft torpedoes began in England. At the end of 1915, Professor A. Low, who worked on the creation of radar devices, was involved in the development of a radio-controlled aircraft to fight the German Zeppelins and to attack ground targets. The projectile aircraft received the designation AT, which meant Aepa! Tagee! (“Air Target”), this was done for secrecy reasons in order to hide the true purpose of the weapon. The AT aircraft was a small radio-controlled monoplane equipped with a 50 hp Gnome engine. With. The first prototype of the AT took off in October 1916, during the tests it turned out that the operation of the engine created strong electrical interference for the radio control system. In this regard, work on AT was stopped, but other aircraft manufacturing firms became interested in the concept of A. Lowe.

At the aircraft factory in Farnborough, a prototype aircraft monoplane torpedo was built with a wingspan of 6.7 mi with a 35 hp engine. s., developed by ABC. One of the aircraft torpedoes of this type was demonstrated in March 1917, but it crashed immediately after launch. Firm Sormÿÿÿ tried to build an aircraft torpedo according to the scheme of a biplane with an ABC engine, but this

the plane was never completed. The exact number of different types of aircraft torpedoes developed by the British during the First World War, and the details of their chronology unclear.

In 1918, the United States began testing the first biplane unmanned aerial vehicles, the M-9 developed by E. Sperry-Curtis and Wise (Bug) designed by C. Kettering. Further tests revealed the advantage of the M-9, after which the US Army ordered an experimental batch of 100 vehicles. The M-9 had the following characteristics: wingspan - 6.7 m, aircraft length - 4.6 m, takeoff weight - 431 kg, maximum speed - 113 km/h.

Work on automated aircraft resumed in England after the war. In 1920, the Bristol E.2B serial fighter aircraft was equipped with radio control and flew successfully, although during test flights the aircraft had a pilot to back up the automatic control system in case of an emergency. In 1921, a radio-controlled aircraft was tested, and in 1927, an aviation torpedo Gaguph (“Gortan”) was tested.

In the Soviet Union, the creation of radio-controlled projectiles was carried out by the Special Technical Bureau for Military Inventions for Special Purposes (Ostekh-Buro), headed by V.I. Bekauri. The TB-1 and TB-3 heavy bombers were chosen for work on the telemechanical aircraft (TMS — that was the name of the automatically or remotely controlled projectile at that time).

In 1933, the Daedalus system was created for the telemechanical aircraft TB-1. It made it possible, after taking off the TMS in manual mode with the help of the crew and subsequent switching to the system, to control the projectile aircraft by radio from the TB-I escort aircraft, after which the crew was ejected from the TMS with a parachute. Further, the projectile was controlled by radio from the control TB-1, and when the TMS approached a certain distance from the target, a signal was given from the control vehicle to dive.

In October 1933, tests began on a prototype TMS (TB-1 No. 750) with an AVP-2 autopilot coupled to radio control devices. At first, only the autopilot was tested, the automation was secured by the pilot sitting in the cockpit. On this plane flights Moscow - Klin - Moscow and Moscow - Odoev - Moscow - Zagorsk - Moscow were made. Set-

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The autopilot maintained the heading during flights satisfactorily, but the speed of the car fluctuated greatly, and several times the pilot had to take the helm and intervene in the operation of the automation.

The next step was to control the TMS by radio, but with the presence of a pilot on board. Command signals were given from the tower of the Central Aerodrome in Moscow. During tests on October 13, 1933, a failure occurred in the control system, after which the aircraft spontaneously went into a dive, but the pilot responded in time and took control. It turned out that the failure of AVP-2 became the cause of the failure. After the repair of the autopilot, they planned to try to attack a conditional target - the intersection of the highway and the railway in Khimki.

The TMS was supposed to be controlled from the board of the TB-3 control aircraft. It was planned that the TMS would fly to Senezhskoye Lake, return and pass exactly over the checkpoint at the crossroads. The tests lasted two weeks, the best achievement was the flight to Dmitrov and back with a deviation of about 100 m when passing the checkpoint.

Subsequently, many different designs of autopilots (pneumatic, hydraulic, electromechanical) and several advanced radio control systems were tested on the TB-1. For example, in July 1934, an aircraft with an AVP-3 autopilot was tested in Monin, and in October of the same year, an aircraft with an AVP-7 autopilot was tested.

In July 1935, Deputy Commissar of Defense M.N. Tukhachevsky approved the assignment for the development of a telemechanical aircraft complex, which received the designation TMS-36. It consisted of two radio-controlled TB-1s equipped with an explosive charge and one TB-3 guidance aircraft. The takeoff of the TB-1 aircraft was carried out by pilots, who then ejected by parachute, further to the target they were led by operators from the TB-3 aircraft, which was moving behind at a distance of 10–20 km. In 1936, experimental aircraft were built and tested, but the TMS-36 was not accepted into service due to the low reliability of the control system. At the beginning of January 1938, work on telemechanical aircraft was stopped, although at that time a method was being worked out for returning a TB-3 projectile pilot to his airfield by transferring to an I-15 or I-16 fighter suspended from TB-3. In addition, TMS TB-3 was developed with

3500 kg of explosives, on the back of which the KR-6 control aircraft was attached. The range of this hitch was about 1200 km.

However, in May 1939, the commissions of the Military Council of the Air Force demonstrated the flights of the TB-1 (serial number 712), controlled by radio from takeoff to landing, there was no crew on the plane. In the act, the commission wrote: “The tests carried out proved that for the first time in the USSR... the problem of creating a Telemechanical aircraft was solved...” The experience gained helped in the design of other, more modern radio-controlled aircraft. In September 1939, the Defense Committee issued a resolution on the creation of telemechanical modifications TB-3, SB, I-16 and UT-2. The work was to be carried out by plant No. 379 together with the Leningrad branch of NII-10. The Krechevitsy airfield near Pskov stood out as a test base; R.G. was the chief designer of the work. Cha-chikyan.

In January 1940, the Council of Labor and Defense issued a resolution on the production of telemechanical aircraft, which put forward requirements for the creation of telemechanical aircraft with takeoff without landing (one-time) TB-3 by July 15, telemechanical aircraft with takeoff and landing (many - one-time) TB-3 by October 15, SB command aircraft by August 25, and DB-ZF by November 25, 1940. These works were carried out as part of the Berkut project.

Several prototypes of remote-controlled aircraft based on TB-1 and TB-3 were built. At the beginning of 194] TMS TB-3 "Bomba" (another name is TB-3 "Torpedo") designed by R.G. Chachikyan successfully passed state tests. Two other TMS, TB-3 and

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command SB, were being tested at the FRI, and two other TMS with command aircraft (SB engineer Nepalimy and UT-2 engineer Nikolsky) were undergoing factory tests in Leningrad. State tests for them were scheduled for July-August 1941, after which it was supposed to form the first special-purpose squadron from telemechanical aircraft. With the beginning of the Great Patriotic War, work on the manufacture of six experimental telemechanical aircraft at the Leningrad Mo 379 plant was mothballed, two

tested sample TMS Th-3 handed over to the Research Institute of the Red Army Air Force for military testing.

At the end of 1941, one fully prepared TMS, consisting of a TB-3 Torpedo (70 22 707) equipped with a 3500-kg high-explosive bomb, and a DB-3F command aircraft were at the jump airfield in Ivanovo. In January 1942, this TMS was sent to destroy the Vyazma railway junction. When approaching Vyazma, the antenna of the DB-3F command aircraft was killed by enemy anti-aircraft artillery fire, so the unguided TB-3 Torpedo went behind German troops. The second copy of the "telemechanical" aircraft burned down at the airfield due to an explosion of ammunition in a nearby bomber. After that, work on telemechanical aircraft in the Soviet Union was stopped.

A year after the termination of work on telemechanical aircraft in the USSR, work on the creation of similar systems began in the USA, the US Navy began research within the framework of the Oriop (“Choice”) project. The first of this project was the remote-controlled aircraft TOM-1 (according to American terminology - ayaski dgope) of the company [schee Aigsai & Enrteeppe], which could carry a torpedo or a bomb under the fuselage. About a hundred TOM-1 aircraft were built, but they were used mainly for training and evaluation tests. GOM-I was followed by a series of GOK-| in the amount of 189 copies. Their first combat use took place in the late summer and early autumn of 1944 in the area of the Solomon Islands during attacks on Japanese ships. Of the 46 launched devices, 29 copies reached the goal. However, the result was not regarded as satisfactory, so the US Navy refused to continue the program further.

The US Air Force developed its own series of projectile aircraft as part of the secret project SopnoPa Me Wotb, Sgoipd Gaipshy (“Guided bomb launched from the ground”), this series had the designation VO. Among the devices of the VO series there were machines of various configurations, including even a re-equipped training aircraft of the Rapsid AB-21 company, but the radio-controlled bombers V-17 and V-24, which carried an explosive charge, turned out to be the most brought to practical use.

In July 1944, the US Air Force adopted a program called Argodne (“Aphrodite”), under which it was supposed to convert part of the B-17 bombers awaiting their repair into radio-controlled projectile aircraft. Approximately 25 B-17 bombers, mostly B-17E modifications, were converted into BO-7s, which were to be used to attack heavily fortified targets, such as submarine repair docks and launch sites for German V-wing missiles. -1. The 562nd bomber squadron, based in Honington (England), was responsible for the combat use of projectile aircraft. After completing the training program, the squadron, equipped with ten projectiles and four command and control aircraft, moved to Fursfield (north-east of London).

Converted B-17 aircraft carried 9,070 kg of explosive Gorpeks with a contact fuse. VO-7s were supposed to take off under the control of a crew of two (pilot and engineer). The crew left the projectile with parachutes after setting the course of the device to the target and bringing the explosives to combat readiness. To improve safety when leaving, the top of the cockpit was cut off. After the crew was thrown out with parachutes,

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the unmanned vehicle continued to fly, remotely controlled from the SO-4 escort aircraft (remake of V-17), for this purpose, the Roie Alop radio control system was installed on the VO-7. At the initial stage of the flight, the VO-7 and ÿÿ-4 were accompanied by a fighter, which, in the event of loss of control of the projectile, was supposed to shoot it down.

As soon as the VO-7 approached a certain distance from the target, its controls, on command from the SO-4 aircraft, were set to the position required for the attack, after which the control aircraft went to the base. The first tests of the VO-7 showed that it needed to be improved. Two television cameras were installed on it - one in the cockpit to monitor the instrument panel and one in the bow to monitor the flight course according to landmarks, images from the cameras were transmitted to the control plane.

The first combat use of the VO-7 took place on August 4, 1944. The target was the starting positions of the German V-1 rockets not far from the Pas de Calais. In the first phase of the operation, two

control aircraft and two unmanned aerial vehicles, but one of the vehicles went out of control shortly after the first crew member parachuted. The device fell near the coastal village of Orford and exploded, leaving behind a huge funnel. The body of the other crew member was never found. The second unmanned aerial vehicle successfully reached the target area, but due to low clouds, the television image on the screen of the operator's receiver in the control plane was poor, so the deviation from the target during the attack was about 500 m. The second phase of the operation was a little more successful. One VO-7 had a control failure even before it could attack the target and was shot down by German anti-aircraft artillery. Another aircraft attacked the target with a deviation within 500 m.

On August 6, two projectile aircraft took off to attack German missile launch sites in France. The crews of the drones successfully left their vehicles after take-off, but a few minutes later one of the vehicles went out of control and fell into the sea. Another unmanned vehicle, due to a malfunction in the control system, suddenly began to move in a circle over the industrial area of Ipswich, but after a while, fortunately, turned away to the sea and drowned.

After these failures, the decision was made to replace the Poie-A7mon radio control system with a Casiog system. The very first raid of a drone with a new control system was accompanied by a disaster: the parachute of the pilot of one of the devices did not open during the jump, and the pilot died. Nevertheless, the unmanned vehicle completely passed along the planned route to the target, but was shot down by anti-aircraft guns and fell approximately 100 m from the target. During the next flight, one of the vehicles crashed, missing the target due to the poor quality of the television image, and the second vehicle sank into the sea due to failures in the control system.

Further operations took place in October without much success. One unmanned vehicle was shot down by anti-aircraft artillery, and the other lost control over the North Sea and crashed into the water after running out of fuel. The third unit failed to detect its target due to poor visibility, so an angry operator from the control aircraft sent it heading for Berlin. fourth demon

the pilot fell close to his target and caused serious damage to it. |

On October 27, the US Strategic Aviation Headquarters in Europe concluded that the actions of the VO-7 devices against heavily wired targets were not successful, so the decision was made to use the VO-7 against industrial targets in large German cities. The first of these sorties took place on 5 December, targeting a railway station west of Hanover. Due to difficult meteorological conditions, the first aircraft was unable to find its original target and was shot down by anti-aircraft artillery while approaching the next target. On the second device

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the warhead did not explode after it fell on the target, and the Germans got a relatively undamaged aircraft with a complete set of remote control systems. The last flight under the Argoake program took place on January 20, 1945, the target was the power plant in Oldenberg. Both projectiles flew past the target, after which the Argode concept was considered unsuccessful. In addition, she proved expensive and was often more dangerous to her crews than to the Germans. |

In 1944, in the Pacific, the US Air Force began converting several worn-out B-240/) bombers into BO-8 radio-controlled unmanned aerial vehicles, which were supposed to be used against heavily defended targets in the Japanese islands. The concept was the same as for the VO-7 vehicles, the takeoff was to be carried out by a crew of two people. After takeoff and climbing to cruising altitude, the crew removes the fuses of the warhead fuses, switches the manual control of the aircraft to remote control from the escort aircraft and jumps out with a parachute. The payload of VO-8 consisted of 11,300 kg of Torpex explosive. The total number of B-24 bombers converted to VO-8 projectiles is not known, but it is known that they never took part in hostilities.

As part of Apu's own project! The US Navy converted at least two RV4Y-1 aircraft (a patrol version of the B-24 bomber) into projectile aircraft, but the designation VO-8 was not applied to these vehicles. The same project included testing a remote control system based on the RU-1 television installation

Weepiga. The image of the television camera from the projectile aircraft was transmitted to the B-17 escort aircraft. The control signal corrected by the system was then sent to the projectile. Two PB4Y-1 flights took place in the North Sea, but without any success. On August 12, 1944, during takeoff, a warhead spontaneously exploded on the first vehicle and killed both crew members. The second apparatus in September of the same year attacked a flat target, but the accuracy of the strike could not be determined, because the television camera was damaged by anti-aircraft artillery fire. Due to the low reliability and lack of accuracy of unmanned weapons, the Alu! soon closed.

Similar work on remote-controlled projectile aircraft was started in 1942 in Germany. On the instructions of the Ministry of Aviation (KEM), the YE Gliding Institute began studying the features of the use of projectile aircraft using the “Mistel” scheme, similar to the “Link” scheme of Vakhmistrov. After the completion of preliminary tests, a program was adopted under the code name "Beethoven". As part of this program, in July 1943, KIM issued the Junkers company with the task of preparing 15 copies of the Mistel 1 combat system. This system consisted of a Ju 88A projectile bomber and a control aircraft - a BE 109E fighter.

In the spring of 1944, as part of the GU group of the bomber squadron KO 101 (1U / KS 101), a special squadron was formed, which began to receive Misteli-|. The control fighter was mounted on the back of the bomber on two front rigid struts and one rear spring-loaded strut. Two options for the combat use of the bundle were envisaged. According to the first variant, takeoff and flight to the target was carried out only with the engines of the lower vehicle running. The engines of the control plane were started when approaching the target, after which the pilot transferred the bunch into a gentle dive and unhooked. The freed bomber dived on the target, and the control aircraft went to the base. The second option provided for the joint operation of the engines of both aircraft until the moment of undocking, while the engine of the upper aircraft was fed with fuel from the carrier. On the night of June 24, 1944, the Mistelei-1 squadron from M / Ka 101 attacked the Allied ships in France at the mouth of the Seine River for the first time.

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Other variants of the Mistele were also developed. For example, Mistel-2 was a combination of a Junkers ÿi 886-1 projectile with a Ku 190A-6 or Yem 190E-8 control aircraft. In 1944, 75 J and 886-1 bombers that were under repair were converted into Misteli-2. The first sample took off in November of the same year, it was planned to deliver 125 samples to VITB.

Mistel-3 was a modernization of Mistel-2, in which an additional landing gear was installed under the fuselage of the projectile, which was dropped after takeoff. The strengthening of the landing gear was caused by several Mistel-2 accidents due to strut failures during takeoff from poorly prepared airfields.

In October 1944, the group of the bomber squadron KS 101 was transferred to the P / KS 200, it was armed with 60 Mistels. In December, it was supposed to carry out a massive attack on the British naval base in Scapa Flow, but due to bad weather conditions, the attack did not take place. Then the German command redirected the Mistels to use them in the framework of Operation Eÿsÿpÿatteg (“Iron Hammer”), which was scheduled for March next year. The essence of the operation was a one-time bombing of power plants located in the European part of the territory of the Soviet Union in order to paralyze the defense industry. About 100 Mistels were required to complete Operation Iron Hammer. According to the scenario of the planned operation, the Mistels were supposed to take off from airfields in East Prussia, but in March these airfields were captured by the advancing Soviet troops. In connection with the change in the situation, P / KO 200 received an order to redirect its Mistels to attack bridges on the Oder, Neisse and Vistula rivers. Since April, the bomber squadron KS 30 has been connected to these hostilities, partially re-equipped on the Misteli.

A variant of the Mistel-3 was developed, which was intended for reusable use as an ultra-long fighter. At the same time, the lower aircraft was piloted by its own crew; in order to achieve the maximum range, two drop fuel tanks with a capacity of 900 liters each were suspended from it.

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"Mistel-4" was a bunch of ÿi 886-7 and fighter "Focke-Wulf" Ta 152N. Until the end of the war, about 250 copies were built, up to 50 copies were captured by the Allied forces in the Mercerburg area.

"Mistel-5" was a bunch of stuffed with 2500-kg explosives of the lower Ta 154A aircraft and the upper control aircraft Ru 190A-8. On July 14, 1944, the specifications were issued, and the Posen plant was supposed to convert four Ta 154A for this combination. The Focke-Wulf firm assumed that the first Mistel-5s would be ready for delivery at the end of August, fifty bundles were being prepared for re-equipment. Work continued with a high degree of urgency until mid-August 1944, but then an order was received from the KEM to stop work.

In the first half of 1944, one of the Savoy-Marchetti 5.M.79 bombers of the Nazi Italian Air Force was converted into a projectile. The aircraft loaded with explosives took off under the control of a pilot on the night of June 4-5, 1944 and headed for Gibraltar in order to attack the British ships stationed there. In a given area, the pilot switched the aircraft control from manual to remote, and then jumped out of the car with a parachute. The projectile aircraft continued to fly by radio signals from the accompanying Cantieri Sap (2.1007-1) control aircraft. However, the attack failed, because due to a defect in the radio control system, the projectile crashed before reaching the target. direction were continued, and the Italian company "Ambrosini" built a prototype aircraft projectile, which passed flight tests in June 1944. There is no information about its combat use.

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Autogyro A-7

ANT-17

BEACH-2

NICK:

E | wee shu

BEACH-3

BICH-14

BIC-21

Blokha A.S. Moskaleva

VIT-2

BOK-5

G-11 (Gr-29)

VS-2 (K-12)

G-26

G-37 (ULK)

G-39

„inti:

Gu-82

Gu-WRD

DB-A

DB-LC

Diskoplan B.N. Yurieva

Diskoplan B.N. Yuryeva (option)

DPT

Link-1 (TB-1 and 2XI-4)

Zveno-Aviamatka (TB-3, 2xI-5, 2XI-16 and 1xI-27)

Zveno-SPB (TB-3 and 2XI-16 with bombs)

I-16 with a bomb

I-16 with closed cockpit

I-16 type 24 with M-63 engine

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I-17

I-110

I-153 from the 71st IAP of the Red Banner Air Force of the Baltic Fleet, 1942

I-153 standard silver paint, 1941

I-153 experimental tricolor camouflage, 1940

I-180-3

I-185 with M-71 engine

I-207 project 10

IL-2

IL-10

IVS

| | + |

K-12

K-15

K-13

Flying tank Kamov

Raphaelian flying tank

LR with M-ZANR engine

LIL

MK-1

APSS

PB-IS

"Shyr hell, yla

MoV-2 (BSh-MV)

PBSh-1

Pegasus

Pe-2

Pe-8 (colour variant)

Pe-8

Glider A-7

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Glider Kurbala

Pneumatic glider Grokhovsky

PSN-2

PSN

RK-I

S-1 VRDK-1

CAM-7

CAM-13

CAM-9

Tandem-MAI

Steel-6

Steel-7

Steel-8

A. A

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TB-3 with I-5

TB-3 with MP suspension (project)

ay 1 tho

E re e

TB-3 with suspension of Gerasimov's observation cabin

TB-3 with PSN suspension

TB-3 with the suspension of the T-37 tank

TB-3 with MV-3 turrets

TB-3

TI

Vakhmistrov strike system (telemechanical glider with two FAB-1000 and control aircraft)

Yak-9

10. RAMING FIGHTERS

The Aviation Encyclopedia defines an air ram as one of the methods of conducting air combat, which consists in striking an enemy aircraft with a propeller or wing (after the ammunition is used up). In the West, it is generally accepted that this unusual

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The combat method was developed at the very beginning of World War II by Soviet pilots in conditions when German aviation had a great advantage over Soviet aviation. In fact, the ram was not an invention of the Second World War at all.

Even at the dawn of the development of aviation, people already thought about the possibility of using an air ram. One of the first who theoretically substantiated this possibility was our compatriot N.A. Yatsuk, who in 1911 published an article stating that the airplane itself is also a weapon. Along with predicting the appearance of cannons, machine guns and bombs on aircraft, he wrote: “It is possible that in exceptional cases pilots will decide to ram someone else’s airplanes with their airplanes.” At the All-Russian Aeronautical Congress in April 1911, he made two reports. Lieutenant P.N. It was then that Nesterov first heard about the air ram, later he and N.A. Yatsuki became friends.

The beginning of the First World War P.N. Nesterov met in the position of commander of the 11th Corps Squadron of the 3rd Army of the Southwestern Front. The main task of the detachment was to carry out aerial reconnaissance, however, staff captain Nesterov was persistently engaged in the development of air combat tactics, as well as a number of technical devices necessary in battle. By

According to some aviation historians, on August 25, 1914, he carried out the first bombing attack in Russia, during which his observer dropped grenades on the Austrian troops. Nesterov held his last air battle in his life on August 26 (September 8, according to a new style), 1914, a kilometer from the city of Zholkev (now the city of Nesterov, Lviv region).

The archives contain the Act of investigation into the circumstances of the heroic death of the head of the 11th Corps Aviation Detachment, Staff Captain Nesterov. Here's what was in it written:

“3. The decision to ram and shoot down enemy air vehicles at the staff captain Nesterov was born a long time ago. So, in the city of Dubno, on August 5-6, he adapted a knife to the rear limb of the fuselage, with which he intended to cut the shell of an enemy airship. During his stay in Zlochev, he decided to adapt a long cable with a load to the tail of the apparatus, with which he hoped to confuse the propeller of an enemy airplane, flying in front of his nose. such.

4. The comrades of the deceased repeatedly pointed out the danger of such actions to him, insisting that when hit in the air, the ramming apparatus must necessarily break, to which Staff Captain Nesterov replied that this had not yet been proven, and, finally, if the apparatus and breaks, it doesn't mean anything, because anyway someday you will have to break, and it is the duty of every warrior to sacrifice oneself.

5. On August 26, Staff Captain Nesterov rose twice to pursue the enemy apparatus: during the first ascent, it was not possible to catch up with the enemy apparatus, in addition, while lifting, while still on the ground, the cable with the load broke, after which Staff Captain Nesterov went down I went to the office, telling me to warn myself if an enemy apparatus appeared. Soon the same apparatus reappeared; Staff Captain Nesterov went to the airfield in a car, hurriedly got on. its double apparatus of the Moran-Saulnier system, as the single-seat crashed; getting into the apparatus, he was in such a hurry that he did not even become attached to it. To Lieutenant Kovanko's words, "What are you going to do, take at least a Browning," Staff Captain Nesterov replied: "Nothing, I'll manage somehow."

6. Staff Captain Nesterov quickly gained height and overtook the enemy apparatus 3'/, versts (north-west of the village of Lipina) at 12 o'clock. 5 minutes. day. Here, being

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higher than the enemy vehicle, he glided at her, apparently with the aim of knocking her down
wheels.

7. Due to the difficulty of taking into account the forward speed of both machines, Captain Nesterov did not hit the Austrian airplane with the wheels, but crashed the engine between the two bearing surfaces of the biplane. This is evidenced by: a) a completely broken Moran screw, 6) the outer cover of the Bowden flexible shaft from the revolution counter wrapped around a fragment of the same screw, c) shaft breakage, separation of the motor from the device and its separate fall to the ground in meters 130 from the first.

8. According to the nature of the fall of Captain Nesterov's "Moran" in a spiral, one can conclude that the wings of such in the first moment following the collision remained intact, and if they sagged, then slightly.

9. Staff Captain Nesterov flew out of the apparatus and fell to the ground separately from the vehicle, about 25 meters from it; the moment of its separation from the apparatus could not be established; there are indications that he took off at the very moment of the collision of the vehicles, but some show that this happened much later than the specified point.

10. Inspection of the wreckage of the Moran indicates that the landing gear bent or broke already in the air, the lower cables were weakened, and at the moment it touched the ground, the apparatus folded so that the ends of the wings looked in one direction.

From the foregoing, it must be concluded that Staff Captain Nesterov deliberately, disregarding personal danger, deliberately rose, overtook and hit the enemy apparatus with his own machine, from the force of the collision, Staff Captain Nesterov's own apparatus was so damaged that Staff Captain Nesterov went down on it could not, was thrown out of the apparatus during one of the sharp movements of the latter and died, crashing on the ground.

During the years of the First World War, Russian pilots carried out two more ram attacks. One of them was carried out by lieutenant Alexander Kazakov, who rammed and shot down the German Albatross, and after the ram he successfully landed. In 1916, an English pilot also made his first ram, he was Lieutenant Leslie Forbes from the 27th Squadron of the Royal Flying Corps. On the morning of September 23, 1916, he spent

all ammunition, after which he decided to go for a ram. With the wing of his fighter, he struck at the Albatross. The German airplane crashed to the ground, its pilot was killed. Forbes managed to make it to the airfield on a damaged plane, but during landing he hit a tree and crashed the plane. With severe injuries, Forbes was taken to the hospital. In his report, he wrote that he deliberately went to the ram. Subsequently, L. Forbes became a marshal of the Royal Air Force.

In 1924, Yatsuk published a work on military aviation tactics, in which, in particular, he expressed the following idea about air ramming: the threat of ramming is a strong means of moral influence on the enemy." According to this tactic, the attacking pilot must strike the enemy aircraft at a vital point with the wingtip of his own aircraft or with the propeller of the engine to cut off the tail surfaces of the enemy aircraft. Although this tactic was often fatal to the attacker himself, with skill and luck the pilot could survive with only damage to his aircraft, or even return and land at his own airfield.

Ideas N.A. Yatsuka and P.N. Nesterov about ram attacks by aircraft were further developed in the 1930s. in the works of P.I. Grokhovsky. Among his numerous inventions (hydrofoil boat, inflatable glider, cassettes for dropping parachute landings, cargo platforms for landing armored vehicles and heavy loads, an arctic unsinkable station, etc.) was

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and a specialized ram fighter, which he tried to create on the basis of the G-39 Kukaracha aircraft (see above).

The ram fighter was conceived on the basis of the “flying wing” scheme. Along the entire leading edge of the aircraft wing, it was supposed to install a knife - a thin metal strip of high-strength steel. In the forward part of the fuselage, a rod protruding far forward was to be attached, which at the same time was the barrel of the air gun. The rod tip was connected to the wing consoles with a thin steel cable. It was assumed that in combat such a fighter would be able to cut the tail of an enemy aircraft with a cable or a knife or rip open the shell of a barrage balloon and an airship. The airgun rod was intended to reinforce

the effect of damaging the structure of an enemy vehicle by firing a projectile at it during a ram. At the end of the spring of 1935, the Cucaracha prototype was tested, but due to the low power of the engine installed on it and some design flaws, it could not take off. The world's first specialized ram fighter for air combat remained at the prototype stage.

Nevertheless, during the Spanish Civil War, Soviet pilots continued to practice methods of ram attacks on mass-produced aircraft. So, for example, in 1937, one of the first two rams in the world was made by the Soviet pilot I.E. Fedorov - on June 18 over Madrid, and on July 21 over Guadalajara. On the night of October 25 of the same year in Spain, Lieutenant E.N. Stepanov destroyed a 5.M.81 bomber with a ram, becoming the first pilot in the world to make a night ram.

At dawn on January 17, 1938, the Spaniard Manuel Orozco, as part of the Republican I-15 fighter jet, flew for reconnaissance in the area of the city of Teruzla. When returning from a mission, they were attacked by a group of fascist fighters "Messerschmitt" BE 109B. Orozco's plane received numerous damage during the battle, but the pilot managed to throw his fighter at one of the German planes and hit him with the right lower wing console. The German plane, which lost control, fell to the ground, and Orozco, with difficulty holding his damaged fighter, brought it to the airfield and landed. In August 1938, Orozco was sent to the USSR for higher command courses. During the Great Patriotic War, he fought in air defense aviation, repelling German bombers, and was considered one of the best specialists in night combat tactics.

On May 31, 1938, in a battle over the city of Hankou (China), Captain A. Gubenko used up all the ammunition, after which he cut off the aileron of the Japanese Mitsubishi A5M2 fighter with the propeller of his I-16 aircraft and landed safely. For this feat, Gubenko was awarded the Golden Order of the Republic of China. Rams were also used by Chinese pilots in battles with the Japanese. For example, on February 18, 1938, a pilot of the 22nd squadron of the Chinese Air Force, Wu Dinchen, in an air battle over the city of Hankow, rammed a Japanese aircraft in an I-15 fighter, after which he landed on a parachute.

Soviet pilots at Khalkhin Gol repeatedly deliberately used an air ram. At least four of them destroyed enemy aircraft using this technique. For example, on June 20, 1939, during a fierce air battle, Lieutenant V.F. Skobarihin saw that his partner's plane was attacked by two Japanese fighters. There was no time to think, and the brave pilot went on a frontal attack. The Japanese could not stand it and at the very last moment tried to soar up. With his I-16 propeller, he ripped open a Japanese fighter, which exploded in the air. Skobarihin barely managed to land his damaged during ramming

airplane.

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The air ram became a truly mass phenomenon during the Great Patriotic War. According to Major General of Aviation A.D. Zaitsev, in 1941-1945. Soviet Air Force pilots carried out 636 air rams, as a result of which more than 1,500 aircrews were lost to enemy aircraft. The air ramming was not provided for by the military charter, manuals or instructions. Soviet pilots resorted to such a last resort not on orders. Here is what Chief Air Marshal A.A., twice Hero of the Soviet Union, wrote. Novikov, former Commander-in-Chief of the Air Force in 1942-1946: “Air ramming is not only lightning-fast calculation, exceptional courage and self-control. A ram in the sky is, first of all, a readiness for self-sacrifice, the last test of loyalty to one's people, one's ideals. This is one of the highest forms of manifestation of the very moral factor inherent in the Soviet person, which the enemy did not take into account and could not take into account.

There is a fairly widespread opinion that ramming is some kind of fatal act of self-sacrifice. However, this is what Aleksey Tolstoy wrote in his front-line essay entitled “Taran”: “A Soviet pilot never evades a fight, and the closer the danger is to him, the angrier his heart, the more prudent his movements, the faster his reflexes ... Soviet the pilots have created a new form of attack, the fascists do not dare to use it. I'm talking about ramming the enemy in the air, provided that not only your life is saved, but also in some cases your car. Indeed, as statistics show, approximately 37% of the pilots died while ramming. However, 63% of the pilots not only survived, but many of them continued to fight and committed

landing on your plane. Moreover, there are cases when pilots made two rams in one battle. Several dozen people made the so-called "double" rams, when the enemy plane could not be shot down the first time and it was necessary to finish it off with a repeated ramming.

Soviet pilots used rams on all types of aircraft: fighters, attack aircraft, bombers, reconnaissance aircraft. Ramming rams were made in group and single battles, day and night, in clear skies and clouds, at low and high altitudes, over their own territory and over enemy territory.

One of the first night rams in the Great Patriotic War was carried out by junior lieutenant V.V. Talalikhin. On the night of August 6, 1941, he flew out on alert in an I-16 fighter to repel a German air raid on Moscow. In the area of the villages of Dobrynikha and Shchegliatyevo, Moscow Region, while trying to intercept the German bomber "Heinkel" He 11], he shot all his ammunition. Wounded in the arm V.V. Talalikhin decided to go to the ram. Having managed to come close to the tail of the bomber, he struck it with the propeller of his aircraft. The bomber with his tail cut off by a stone went down. Talalikhin managed to leave the damaged fighter and land safely by parachute. For this attack, V.V. Talalikhin was awarded the title of Hero of the Soviet Union.

Senior Lieutenant N.V. Terekhin, on the morning of July 10, 1941, at the head of an I-16 flight, took off to repel an attack by enemy Junkers Li 88 bombers. During the battle, he used up all his ammunition, and in order to prevent the bomber from escaping, Terekhin decided to ram it. He managed to get close to the enemy and chopped off his tail with a propeller. Since the bombers were in close formation, the falling ÿi 88 hit the neighboring bomber with its wing, as a result of which both enemy aircraft crashed to the ground. Terekhin landed by parachute. The crew of the downed Junkers landed nearby, while still in the air the Germans opened fire on our pilot with pistols. Terekhin continued to fight on the ground, firing back with his pistol until local collective farmers arrived at the landing site, who helped to disarm and tie up the Nazis. At the command post of the division, Terekhin appeared with a pistol in his hand and with a rope with which the captured German pilots were tied. For this feat, Terekhin was awarded the Order

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den of Lenin. On July 18, 1941, in an air battle on the outskirts of Leningrad, he shot down a third enemy aircraft with a ramming attack. |

On July 25, 1942, pilot O. Kilgovatov took off to intercept the German Focke-Wulf Ku 189 reconnaissance aircraft near Stalingrad. In the battle with the cover fighters, he used up all the ammunition. In order to prevent the scout from leaving, Kilgovatov decided to go for a ram. Twice he hit him with the wing of his fighter, but the enemy continued to fly. Then he struck with a propeller, but after that the scout continued to fly. However, the fourth ramming was decisive. The crew of the German aircraft parachuted out and were taken prisoner. Kilgovatov managed to bring his damaged aircraft to the airfield and land, for this feat he was awarded the Order of the Red Banner.

Senior Lieutenant Ya.A. Aleksandrovich flew out on August 20, 1942 at the head of a pair of LaGG-3 fighters to escort bombers. In the area of the village of Veselovskaya, Krasnodar Territory, he entered into battle with 7 enemy fighters. From the very first attack, he shot down the BE 109, and then attacked the second Messerschmitt, which was next to our bomber. manager. It was impossible to shoot, so the bomber could also suffer. Then Aleksandrovich decided to ram the enemy. On the opposite course, he went to the Messerschmitt and, in a combat turn, hit the right wing console from below on one of the wing planes of the BE 109. Having lost the plane, the enemy plane turned over and flew down sheer. Aleksandrovich managed to keep his fighter in the air. Together with the wingman, he continued the fight until our bombers had completed their task. Then the pilot brought the damaged plane to his airfield and landed safely. For this feat Aleskandrovich was awarded the Order of Lenin.

Senior Lieutenant A.S. On April 8, 1942, Khlobystov, in an air battle near Murmansk, having no time for aiming, hit the tail of a Messerschmitt BE 110 heavy fighter with the left wing plane of his aircraft. Having lost control, he crashed into a hill. Then Khlobystov shot down another plane with fire from the airborne weapon. Soon, reinforcements consisting of 8 Messerschmitts approached the Germans. Having completely used up the ammunition, Khlobystov again used

ramming, hitting the enemy aircraft with the right wing plane. On a damaged and barely controllable plane, he managed to reach his airfield and safely complete a landing. On May 14, 1942, Khlobystov flew out as part of a group of fighters to repel an enemy air raid on Murmansk. At the very beginning of the battle, he was wounded in the arm and leg, his plane was damaged, smoke and the engine flared up. Despite this, the pilot managed to destroy VG 109 with a ramming blow. From the impact, Khlobystov was thrown out of the cockpit through an open canopy, however, losing consciousness, he managed to open his parachute. For his third ram A.S. Khlobystov June 6, 1942 received the title of Hero of the Soviet Union.

Junior Lieutenant V.P. On May 2, 1943, Mikhalev destroyed an enemy bomber by ramming in a Yak-7B in an air battle, after which he landed on his damaged aircraft. October 20, 1943 senior lieutenant V.P. Mikhalev rammed the second fascist plane in an air battle, and later rammed the third plane, on July 1, 1944 he was awarded the title of Hero of the Soviet Union. After the war, V.P. Mikhalev continued to serve in the Air Force, and among the first mastered the jet aircraft. He was awarded the Orders of Lenin, the Red Banner, Alexander Nevsky, the Patriotic War of the 1st and 2nd degrees, the Red Star, and medals.

October 29, 1941 junior lieutenant B.I. Kovzan took off on a MiG-3 aircraft to escort attack aircraft to the area of the city of Zagorsk, Moscow Region. In an air battle with four BE 109s, he knocked out one of them, but at the same time used up all the ammunition. Returning to his airfield, at an altitude of 5000 m, he discovered an enemy air reconnaissance aircraft ÿi 88. In order to prevent him from leaving, Kovzan

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decided to ram him. He went behind the Junkers from below and equalized the speed, then he stepped on the gas and abruptly took the handle back. The blow shook his fighter, but Kovzan managed to control the controls. The German plane, somersaulting, went to the ground. Kovzan landed safely at his airfield. On February 22, 1942, Senior Lieutenant Kovzan rammed an enemy bomber in the Vyshny Volochok area on a Yak-1 plane. He landed on a damaged aircraft. On July 8, 1942, in the area of the village of Lobnitsy, Novgorod Region, in an air battle on the same aircraft, he carried out a third ramming, shooting down an enemy fighter. He made a safe landing on a damaged aircraft.

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On August 13, 1942, near the city of Staraya Russa, Captain Kovzan on a La-5 aircraft discovered a group of 7 bombers JI 88 and 6 BE 109 escort fighters. Having shot down one fighter with a well-aimed burst, Kovzan rushed to the Junkers. Suddenly, the enemy burst hit the cockpit, while Kovzan was wounded in the right eye. He made an attempt to jump out with a parachute, but for this he no longer had the strength. At this time, a Junkers appeared directly in the direction of his fighter, and Kovzan directed his hot plane at him. Both planes fell to pieces on impact. Our pilot was thrown out of the cockpit through an open canopy. From a height of 6000 m, he fell into a swamp, and this saved his life. In the fall, he broke his left leg, arm and several ribs. It was his fourth ramming, a unique achievement in the history of world aviation.

The collective farmers arrived in time to pull the pilot out of the quagmire and delivered him to the partisans, who ferried him across the front line. Kovzan spent 10 months in hospitals. After the hospital, he obtained permission to serve with one eye in fighter aviation. Until the end of the war, he shot down 6 more enemy planes, bringing his personal score to 28. After the war, he continued to serve in aviation, in 1954 he graduated from the Air Force Academy. B.I. Kovzan was awarded 2 Orders of Lenin, Orders of the Red Banner, Orders of the Patriotic War of the 1st degree, Orders of the Red Star,
medals.

Ram attacks were carried out by foreign volunteer pilots who fought as part of Soviet aviation units. So, for example, the Frenchman Pierre Lauriyon from the Normandie-Niemen Fighter Regiment on October 17, 1944, used up all the ammunition in an air battle. In an effort not to miss the enemy, he hit the tail of his Yak-3 with the wing of the Yem 190 and shot him down. With great difficulty, the pilot managed to bring the damaged fighter to his airfield. During landing, the plane rolled over, but P. Lauriyon remained unharmed.

Spaniard Vicente Beltran emigrated to the Soviet Union after the defeat of the Republicans in the Civil War. When the Great Patriotic War began, he filed an application with a request to send him to the front. At the end of July, he, along with other Spanish pilots, was sent to a reconnaissance aviation special group equipped with captured not

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German aircraft, then he fought in the air defense aviation. In the summer of 1942, for one week, he twice rammed enemy German aircraft on the distant approaches to Moscow. After the end of the war, V. Beltran continued to serve in the air defense.

Allied pilots also occasionally carried out ram attacks. One of them was Lieutenant Ripley Jones of 126 Squadron RAF. On October 17, 1942, during the defense of Malta, repelling a German raid on the Luka airfield, a JI 88A bomber rammed a Spitfire MK P fighter. The impact caused both planes to disintegrate in the air, but Jones managed to land by parachute.

During the war, Soviet aircraft designers again turned to the idea of creating a specialized ramming aircraft. So, for example, at the beginning of 1942, a military engineer of the 3rd rank L.G. Golovin proposed a small-sized military escort fighter-interceptor (IVS) with a solid-fuel rocket engine. By design. constructor

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an interceptor with a recumbent pilot had to take off from a mobile launcher in the location of troops, guarded objects or from the deck of a ship, the landing of the aircraft had to be carried out by parachute. It was assumed that such a rocket aircraft did not have. on board Tu cannon weapons, will hit the target with the help of a ram.

However, this proposal did not receive support, and on the recommendation of the customer, the author developed a draft of another version in a classic layout with a seated pilot. The aircraft was armed with a 20 mm ShVAK cannon, and an LRE designed by L.S. Dushkin with a thrust of 300 kgf. However, the idea of taking off from a ground or ship installation was preserved; during takeoff, a starting solid-propellant booster with a thrust of 1000 kgf was to be used. According to calculations, it turned out that an aircraft with a length of 3.0 m, a height of 1.05 m, a wingspan of 1.75 m and a weight of about 270 kg can reach speeds of up to 1060 km/h, rate of climb up to 270 m/s and reach a practical ceiling of 7500 m. But the IVS project was never implemented. The expert commission, having confirmed its feasibility, nevertheless considered that the construction of the vehicle was inexpedient due to the low altitudes of its use (up to 8000 m), at which anti-aircraft artillery operated more effectively.

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During the war, air rams were also carried out by the pilots of the Axis countries - the Germans, Italians and Japanese. Regarding the Germans, it is known that at the beginning of the war, having superiority in the air, they did not use the ram as a method of conducting air combat. Moreover, at the beginning of the war, a circular was even sent to the Luftwaffe units, forbidding them to approach Soviet aircraft closer than 100 m, in order to avoid ramming from their side. However, the further course of the war made its own adjustments to the tactics of conducting combat by German pilots, and the Luftwaffe command turned to the idea of using a battering ram to counter the attacks of armadas of allied bombers. ;

The reason for this was the loss of German aviation superiority in the air and the increasing use of fighters to perform defensive tasks, as well as receiving data from their intelligence that the percentage of losses of the Red Army Air Force flight personnel who committed an air ram was below 40%. Therefore, KIM in early 1944 adopted a program for the development of object fighters, which were supposed to take off from a launcher, like the Golovin IVS fighter, or take to the air with the help of a carrier aircraft or a towing aircraft. It was believed that such a small interceptor should first attack the formation of bombers using cannon or rocket weapons, and after the ammunition was used up, attack the enemy with a ram. The probability of massive losses of these mini-interceptors during combat operations was assessed by experts as very high, therefore, the technical requirements issued by the KEM in the late spring of 1944 provided for the maximum simplification of the aircraft design, the use of the cheapest materials in the manufacture and unskilled labor during assembly. Work on ram fighters was carried out at Arado (Ag E.381), Bachem (Ba 349), Gota, Messerschmitt (Me R.1103, Me R.1104), Sombold (5o 344) and "Zeppelin" (Eperepde Rapgepaiz! - "Flying Armored Fist" and Katteg - "Garan").

However, until the end of the war, all these projects remained unrealized. Therefore, special groups of “hunters” appeared in the air defense of the Reich, staffed by volunteers and penalized soldiers who flew ordinary serial fighters. Penal keeper signed a commitment in every fight

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shoot down an enemy bomber. If there was not enough ammunition, then they were obliged to go to the ram. Failure to fulfill an obligation was seen as "cowardice in the face of the enemy".

At the beginning of 1945, when thousands of Allied bombers were already flying over German territory, the Luftwaffe command tried to use the tactics of mass ram attacks.

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against Allied bombers. As part of the preparations for Operation Werwolf (Werewolf), a unit was formed, for the pilots of which about 2,000 maximally lightweight serial BE 109 fighters were trained. The training of pilots in ram attack tactics began at a specially created Elba school.

Operation Werwolf took place on April 7, 1945 in the Magdeburg area, when 120 rammed Messerschmitts went up to intercept Allied bombers. In total, on this day, the Germans managed to inflict 23 ramming attacks, however, the effectiveness of these strikes was low - only 8 American B-17 and B-24 bombers were shot down. The rest of the bombers, despite significant damage, managed to reach their airfields or make an emergency landing in the territories liberated from the Germans. The Germans, during this operation, lost almost all of their vehicles.

Work on the creation of specialized ram fighters was also carried out during the war in the United States. The seriousness of the intentions of American aircraft designers to develop ram fighters is evidenced by the fact that a special device for relatively safe ramming of enemy aircraft was patented in the United States. This device was a long saw with sharp steel teeth, which was hinged under the fuselage of the fighter (remember P.N. Nesterov's ramming knife, which was attached from below in the tail section of the aircraft). In the usual position, the saw was retracted into the fuselage, but it was released when attacking enemy aircraft. With the help of a saw, it was possible to cut wings, tails, cockpits, etc.

In September 1942, the terms of reference were issued to US aviation firms for the development of a ram mini-interceptor. Based on the results of studying the proposals of firms, a contract was signed with Northrop for the development of three experimental aircraft: two gliders under the designation MX-334 and one MX-324 Koske aircraft!

Mitya ("Rocket wing") with a HSA!-200 rocket engine with a thrust of 90 kgf. All three machines were supposed to become flying laboratories to obtain the data necessary for the development of a future combat aircraft under the designation XP-75. The MX-324 took off with the help of a drop-down launch cart, and landed on a ventral ski.

Although the MX-324/334 was originally designed as a pure "flying wing" without vertical surfaces, it was later found that it needed a vertical tail to improve maneuverability. A plywood keel was added, which was reinforced with wire braces. The first towing flight of the MX-334 took place on October 2, 1943, and the first flight of the MX-324 with the engine turned on after uncoupling from the towing vehicle took place in July of the following year. The running time of the engine, running on monoethylaniline and fuming nitric acid, was a little over 4 minutes.

However, problems with the low-power KhSAG-200 engine forced the development of the XP-75 to be abandoned and the development of a new aircraft XP-79 Kat Ups ("ramming wing") with the Ko! engine started. o|e!, which also worked on monostilaniline and fuming nitric acid, but had a thrust of 900 kgf. The aircraft structure was welded and made mainly of magnesium alloy; The pilot in the cockpit was lying down. In the tail section of the fuselage there was a vertical keel. Tests of two variants of the XP-79 and XP-79a aircraft (several large dimensions) showed their unsatisfactory flight qualities, after which it was decided to abandon the use of the LRE. The new modification of the XP-79B aircraft was equipped with two J30 turbojet engines with a thrust of 522 kgf each. The air intakes of the engines had a rectangular cross section, two vertical keels were installed in the rear fuselage, and the landing gear was made of four struts. The first flight of the XP-79B, which took place on September 12, 1945, was also his last. The plane took off normally, carried out the flight task for 15 minutes, after which it unexpectedly fell into

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corkscrew. The pilot, unable to get the plane out of a spin, died. Immediately after this disaster, the XP-79B program was terminated.

11. Gliders

In the 20-30s. In the Soviet Union, the idea of using gliders for airborne transport operations was developed. Still in 1926, a young pilot-designer V.K. Gribovsky designed the G-3 four-seat glider, in 1932, the G-11 two-beam six-seat glider, and then the G-14 tanker transport glider.

In 1932 P.I. Grokhovsky and B.D. Urlapov developed the 16-seat landing glider G-31 (G-63), in 1935-1936. G.F. Groshev five-seat glider G Ho 4 and four-seat G No. 8 for transportation in tow behind the fighter of service personnel, necessary devices and tools when relocating aviation units to a new location. 2%

Although in the USSR in the early 30s. For the first airborne troops in the world, the first airborne transport gliders were created, and later work in this direction almost ceased. Just as the more exotic projects of P.I. Grokhovsky: heavy transport gliders for transporting a tank, delivering 50 paratroopers, a bomber glider, etc. But by the time when work on landing gliders had almost ceased in our country, in Germany, in the strictest secrecy, these works just unfolded.

With the help of OE$ 230 landing gliders, developed in 1937, German paratroopers carried out one of the most unusual operations of the Second World War. At 5:20 am on May 10, 1940, 11 OE5 230 gliders landed on Fort Eben-Emael in Belgium and landed a sabotage group

"Granite" consisting of 84 people, taking by surprise the garrison of the fort. Each group of paratroopers attacked their target, while shaped charges weighing from 12.5 to 50 kg were used against artillery towers and shelters, grenades and explosive packages were thrown into the holes pierced by the explosion. After an hour-long battle, most of the fort was captured by paratroopers. As a result of this operation, a day later the entire fort was under the control of approaching German troops. The largest operation involving REZ 230 was the operation to capture the island of Crete a year later, the number of gliders simultaneously involved was 53 copies. During the war, the Germans regularly used airborne glider squadrons in various operations, as well as separate glider squadrons. Since the beginning of the war, active operations for the development of landing gliders were carried out in the USA, England and Japan.

In our country, the expediency of introducing glider units into the troops was discussed by military theorists until 1940. It was only at the end of January 1940 that a department for the production of airborne transport gliders was created in the People's Commissariat of the aviation industry, the chief engineer of which was appointed aircraft designer Pavel Vla - Dimirovich Tsybin. In November 1940, People's Commissar of Defense Marshal of the Soviet Union S.K. Timoshenko approved the new states of the airborne brigades, now they included not only parachute and landing aircraft. groups, but also a glider group. -

Immediately after the start of the war, a squadron of testers was organized in the parachute troops, headed by test pilot Sergei Nikolayevich Anokhin. This squadron took part not only in flight tests of gliders, in working out a peculiar technique for towing them, one by one or in a group, but also actively participated in combat sorties behind enemy lines, to the partisans of Belarus. They usually flew there on G-11, A-7 and KTs-20 gliders; these multi-seat landing gliders were towed by SB or Il-4 aircraft. The flights were always carried out at night, the complexity of these flights was due to the fact that usually the gliders were extremely loaded with weapons and ammunition, and they had to land on small

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partisan forest airfields. As a rule, the gliders that arrived to the partisans were destroyed, since taking off

from limited sites was impossible. However, the skill of S.N. Anokhin and his comrades made it possible, in case of emergency, to take off from a partisan airfield, for which an ultra-short cable was used - only 10 meters long, instead of the usual hundred-meter-long cable. Moreover, S.N. Anokhin successfully completed a test flight, which tested the possibility of towing the A-7 glider behind the SB aircraft on a short rigid thrust.

And

A-2

In OKB O.K. Antonov before the war developed a two-seat training glider A-2, during the war military glider pilots were trained on it. These gliders were used in gliding clubs until the second half of the 1950s.

Characteristics of A-2: crew - 2 people, wingspan - 13.50 m, area - 16.13 m?, length - 6.0 m, height - 1.6 m, takeoff weight - 357 kg, maximum speed - 130 km /h

A-7

During the war years, the glider designed by O.K. Antonova. A prototype of this airframe under the designation A-7 was manufactured in the summer of 1941, in October Antonov's group was evacuated from Kaunas to Western Siberia. In Tyumen in the winter of 1942, the A-7 began to be mass-produced. The design of the airframe was almost entirely made of wood, the two-wheeled landing gear was removed mechanically from the cockpit in flight. To reduce the length of the run, landing was carried out on the ventral ski. The A-7 glider was towed by DB-3, DB-3F or SB aircraft. It was built in two modifications — an amphibious cargo vehicle for transporting 7 people or cargo weighing up to 1000 kg and a tanker.

The A-2 tanker glider, intended to increase the flight range of a bomber aircraft, had two gas tanks in the cargo compartment with a total capacity of 1000 liters, an electrically driven fuel transfer pump powered by batteries, as well as equipment for transferring fuel to the aircraft. The fuel supply to the aircraft was carried out through a durite hose, which was attached to the towing cable.

Flight tests of the airframe A-7 "fuel truck" with a special. modified aircraft DB-3 were carried out in late 1942 — early 1943, but this modification of the airframe was not used in combat operations.

In total, during the war years, at least 400 A-7 gliders were produced, which, together with the G-11 gliders, were in service with two air glider regiments of the Airborne Forces. In October and November 1943, the crews of fifteen SB tugbombers and 35 A-7 and G-11 gliders from the 1st Air Glider Regiment threw landing groups into the rear of the 16th German Army. In February and April 1944, the regiment worked for partisans in the interests of the 1st Baltic Front.

Crews of Il-4 tugs and gliders from the 2nd Aviation Glider Regiment delivered flamethrowers and antifreeze for tanks near Stalingrad. And in March 1943, the regiment participated in three separate operations to ensure the combat activities of the partisans and to land special troops behind enemy lines. During 60 sorties, the partisans received 142 commanders and demolition men, 4 tons of explosives, 12,000 hand grenades, 100 anti-tank rifles, 95 mortars, 1,900 assault rifles, 700 rifles,

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95 thousand rounds of ammunition, 3 tons of medicines. From April 19 to May 20, 1943, two dozen gliders delivered 19 tons of ammunition and weapons to the partisans.

Characteristics of the A-7: crew - 1 person, wingspan - 18.0 m and its area - 23.2 m, airframe length - 10.54 m, height - 1.53 m, empty weight - 955 kg, normal flight weight - 1760 kg, weight of the reloading variant - 1875 kg, maximum allowable gliding speed - 400 km/h, maximum allowable towing speed - 300 km/h, landing force - 7 people.

AM-14

At the end of 1942 A.S. Moskalev was entrusted with the modernization of the seven-seat landing glider A-7 into an eleven-seat one. The new airframe, designated AM-14 (Antonov-Moskalev), was built in 1943 at a former woodworking plant in the village of Zavodoukovsk near Tyumen. The following changes were made to the design of the A-7: the fuselage in the middle part was lengthened by 670 mm, the wing area and the span of the horizontal tail were increased, and a more powerful landing gear was installed.

At the end of May 1943 A.S. Moskalev received an urgent task to prepare 50 AM-14 landing gliders, which should be transferred to the Minsk region to the Belarusian partisans. Gliders must be equipped with devices for transporting fuel, weapons, including cannons. The production time was tough, 50 gliders had to be made in 25 days. I.V. was personally interested in the progress of the assignment. Stalin.

The operation to transfer the gliders to Belorussia was well-kept secret and turned out to be unexpected for the Germans. The command and flight personnel of the Airborne Forces participated in this operation, the transfer of landing gliders took place at night. Aircraft DB-ZF and Li-2, towing two gliders each, approached the partisan base at high altitude. Here the gliders uncoupled and glided, passing a distance of up to 50-60 km. Fires and prepared grounds were waiting for them below, everything went off safely and in a timely manner. The result was a complete defeat of the punishers, who, when attacking a partisan base with the aim of destroying it, received a crushing rebuff. For operational assistance to partisans O.K. Antonov, V.K. Gribovsky and A.S. Moskalev were awarded partisan medals of the 1st degree.

BDP/MP

At the very beginning of the war, N.N. Polikarpov developed the project of the BDP combat landing glider. The BDP was designed to carry 20 people, seven machine guns were installed in various places of the airframe fuselage for use by paratroopers in air combat. The glider took off on a wheeled chassis, dropped it in the air and landed on skis located on the sides of the fuselage. The first BDP took to the air in the summer of 1941. The testers gave a good rating to the airframe, but on October 14, the tests were interrupted due to evacuation.

In 1942 N.N. Polikarpov designed the BDP-2 glider-bomber based on the BDP. Bombs weighing up to 2000 kg were placed inside the airframe fuselage. The built prototype began testing, which was carried out from February 6 to March 14, 1942. Based on the test results, it was proposed to launch the airframe into mass production with a batch order of

100 cars. However, only a few copies of the BDP-2 were built, which were handed over to Aeroflot for the transportation of oversized cargo.

Based on the BDP-2 glider N.N. Polivinan developed the landing and cargo motor glider MP. The MP was equipped with two M-11F engines, the airframe chassis was wheel-ski with wheels dropped in flight. In the fuselage. there were two cargo doors. The motor glider was released and passed

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state tests in 1943. But it was recognized that it was not advisable to put it into a series, since it was inferior in its characteristics to the She-2 aircraft with two M-11D engines.

Characteristics of the MP: crew - 2 people, power plant - 2 x M-11F with a capacity of 145 hp each. s., wing span - 28.0 m, its area - 70.0 m2, airframe length - 18.6 m, empty weight - 1400 kg, maximum flight weight - 3200 kg, maximum speed - 172 km / h, range - 700 km, service ceiling - 2000 m, maximum flight duration - 7 hours, armament - 7 DP machine guns, landing force - 20 people.

VP-1

In 1942 O.K. Antonov developed a project for an unmanned aerial trailer VP-1. It was a glider designed to be towed behind a heavy bomb fighter. The hitch with the aircraft was carried out by means of a rigid traction (drawbar), which was structurally part of the VP-I. The glider was designed to deliver the FAB-500 bomb weighing 500 kg.

At the end of the winter of 1942, the VP-1 model with a take-off weight of 120 kg was tested in Tyumen. When towing behind the U-2 aircraft, the trailer behaved stably, and only a slight sway was observed during the landing approach. In one of the flights, a mock FAB-500 bomb weighing 50 kg was dropped, which did not affect the behavior of the airframe. However, VP-I was not mass-produced.

Similar work to test the towing of bombs was carried out in Germany. At the end of the war, the Arado jet bomber Ag 234 was tested to tow the ÿÿ 103 (FAU-1) cruise missile, which took off on a drop cart. The R 21 bomber glider, similar to the VP-1 glider, was also tested in tow near the Fizeler G 99 light aircraft.

G-9

In the winter of 1931/32 V.K. Gribovsky started designing the G-9 glider, which was structurally and technically adapted for flights in tow behind the aircraft. On September 29, 1932, an air train consisting of a U-2 aircraft and a G-9 glider took off from the Tushino airfield in Moscow and soon arrived in Koktebel (Crimea), where the G-9 was to take part in the US All-Union Glider Pilots' Rally and undergo aerobatics tests. This first long-distance flight, with its successful completion, fully confirmed the possibility of using towed gliders for transportation.

Until 1939, this glider was built serially and was considered the main training device for towing and aerobatic flights. During the operation of the G-9, several records were set on it, in particular, in 1934, an all-Union record for the duration of a flight without landing was set - 35 hours 11 minutes. On May 5, 1934, in Samara, a G-9 glider was picked up from the ground by a U-2 aircraft flying at a speed of 120 km/h. Later, in Tushino, experiments were carried out to pick up a glider in tow in the air.

In 1937, the G-9 glider, towed by the R-2 aircraft, reached a height of 12,105 m. In this flight, the R-7 tug flew at an altitude of 8500 m, the glider had an excess over the aircraft of 3605 m. The possibility of such towing was provided by a special winch , developed by designer A.Ya. Shcherbakov. At the moment of launch, the glider was connected to the aircraft with a standard cable 100 m long. After climbing a certain height, where the air environment was quite calm, the winch was turned on, which unwound a thin steel wire with a diameter of 0.2 mm, which made it possible to increase the length of the tug to 7000 m. .

G-9 was also used to test the possibility of using gliders as a detachable cabin of stratospheric balloons in an emergency. So, for example, on July 4, 1938, the G-9 glider with the pilot was lifted by the USSR VR-61 stratosphere balloon to a height of 5100 m, after which the glider successfully uncoupled and returned to the launch site. In 1938 at an aviation festival in Tushino

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an "air train" was demonstrated, made up of nine G-9 gliders towed by a TB-1 aircraft. A year later, the number of gliders towed by one aircraft was brought to a maximum of 11 specimens.

The G-9 became one of the best Soviet pre-war gliders; in 1936, serial production of the G-9 began in Turkey, where Soviet specialists, among other things, helped organize sports gliding.

G-11 (G-29)

A prototype of an airborne cargo glider, created under the direction of V.K. Gribovsky, was built by the beginning of August 1941. Flight tests of the airframe began on September 1, and already on September 18 it was decided to start serial production of the airframe under the designation G-11 (Gr-11, G-29). The glider, made of wood, was designed to carry 11 people or 1200 kg of cargo. He took off from a wheeled chassis, and sat on a ski, which dramatically reduced the mileage during landing. In the case of landing on a ski, the wheeled chassis, equipped with a “breaking” strut, moved back and up.

In the forward part of the fuselage there was a cockpit with a resettable lantern. Behind the pilot's cabin was a cargo compartment 3.24 m long and 1.36-1.25 m wide. The paratroopers were seated on benches located along the sides of the fuselage, facing each other. For loading the airframe and leaving it, on each side of the fuselage there was one drop-down door measuring 1.2 x 0.7 and two oblong windows that could be opened for firing by paratroopers from personal weapons. For the same purpose, there were opening hatches in the ceiling and in the floor measuring 0.51 x 0.46 m.

Until the end of 1941, 10 serial devices were built. G-11 production increased until June 1942, when it became clear that the military was not ready to receive a large number of gliders, since they did not have enough towing aircraft and trained glider pilots. As a result, the production of the G-11 was stopped in 1942, and the total production by the autumn of 1942 amounted to 308 copies. At the end of 1943, production of the G-11 resumed.

The glider was towed by DB-3F or SB bombers. Especially active gliders were used to supply the partisans in 1943-1944. In August 1944, V.K. Gribovsky was awarded the medal “Partisan of the Patriotic War” for the delivery of goods by G-11 gliders to the partisans of Belarus.

In the course of mass production, changes were repeatedly made to the design of the airframe. Production of the G-11 ceased in mid-1945, with only about 500 examples built.

VC. Gribovsky, on the basis of the G-11, developed a project for a motor glider with an M-11 engine with a power of 100 hp. With. Two options for installing the engine were considered (in the forward part of the fuselage and on a pylon above the wing). As a result, we chose the second option, which allowed us to carry out alterations with a minimum of changes on any serial device. In the summer of 1942, the motor glider G-11M (G-30) was tested. In the future, it was planned to install a more powerful MV-6 engine or put two M-11 engines in the wing. However, this option did not receive development due to the advent of the Sche-2 aircraft.

Characteristics of the G-11: crew - 1 person, wingspan - 18.0 m and its area - 30.0 m?, airframe length - 9.71 m, height - 2.7 m, empty weight - 1250 kg, normal flight weight - 2400 kg, maximum gliding speed - 146 km / h, maximum towing speed - 370 km / h, landing - 11 people.

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G-14

The double glider G-14 was created for training in figure and towing flights. It was also supposed to perform night flights, for which it was equipped with the necessary flight instruments and air navigation lights. Several copies of the airframe were built and used in various experiments.

One of the samples was converted into a fuel truck for experiments with pumping fuel in the air. The first transfer of gasoline from a glider to a towing aircraft took place on May 24, 1935, it happened at an altitude of 1200 m, when 150 kg of gasoline was poured from the G-14 glider into the R-5 tugboat in 15 minutes. |

After this successful experiment, it was decided to build a special version of the airframe - G-14 "Flying Tank" (G-14 TsL-2A). In connection with the installation of additional gas tanks and an increase in flight weight, the airframe design had to be strengthened. Hoply placed in five welded aluminum tanks: four - in the root parts of the wing (two

on each side) and one tank in the fuselage in place of the rear cockpit. The total capacity of the fuel lifted into the air by the "Flying Tank" was 500 liters. The tanks were connected with a universal towing lock with the help of a system of pipelines and valves. The towing connection was a thin durite hose through which fuel was poured. A cable was passed inside it, perceiving power loads.

In the autumn of 1935, the “air train” consisting of the P-5L aircraft and the G-14 TsL-2A glider made a non-stop flight, with refueling of the towing vehicle in flight from the glider, from Moscow to Koktebel. The total length of the route was 1524 km, which corresponded to the record value of non-stop towing.

The G-14 was used to develop the “chain” method, when several gliders are towed one after the other, with each subsequent glider flying higher than the previous one. During testing, a bunch was used - a tug TB-I, an intermediate glider G-14 and a trailing glider G-9. The intermediate G-14 was finalized in the following way. The front cockpit was enlarged and covered with a transparent canopy that can be folded back. A drum with a long 2 mm cable, unwound by a special winch, was installed in the rear cockpit. For a safe exit of the cable, a long pipe was fixed on the right side of the fuselage, reaching the vertical tail.

Many “chain” flights were performed, by the beginning of April 1936 the following results were recorded: TB-1 flew at an altitude of 5000 m, G-14 at 6000 m, trailing G-9 at 7000 m.

Interestingly, the Americans began to develop tanker gliders only at the end of the war. So, for example, in 1944 an American firm. Cornelius developed the XREO-1 unmanned glider designed to refuel long-range bombers in flight. It was assumed that the bomber should be towing a tanker glider with a fuel reserve of 2563 l. After the supply of fuel in the tanks of the glider is used up, the glider must be uncoupled. The first two prototypes built by Zrapap began flight testing in the autumn of 1944, during testing one airframe was destroyed, and the second continued to fly until the end of 1945, when the program was closed. |

G-31

In 1932 B.D. Urlapov, who worked under the direction of P.I. Grokhovsky, a landing glider for 16 people was designed. In October of the same year, a prototype glider, called the G-63, was built and passed flight tests. Sixteen paratroopers were placed in a prone position in the center section, divided into cells. The side walls of the cells at the same time

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served as ribs of the wing, and the nose part of the center section represented transparent sections that leaned forward. The glider was towed by a R-5 reconnaissance aircraft. G-63 became the world's first airborne glider.

In one of the flights, the G-63 crashed. During the repair, the design of the glider was improved: the area of the rudder was increased, the deflection angles of the rudders and ailerons were changed, the second pilot's seat was equipped, etc. After the restoration, the glider received the designation G-31. Two years later, the second copy of the G-31 was ready, called "Yakov Alksnis", and in 1935 the first copy was converted into a G-Z] A glider, as motor gliders were then called, by installing an M-11 engine with a power of 100 l. With. The fuel supply allowed the motor glider to stay in the air for up to 20 hours. During tests, the G-Z1A, with a payload weight of 1400 kg, reached a maximum speed of 120 km/h and a practical ceiling of 5000 m. A later modification of the G-Z1A motor glider was equipped with the M-25 engine.

Characteristics of the G-ZTA: crew - 2 people, power plant - ÿ x M-25 with a capacity of 700 liters. s., wing span - 28.0 m and its area - 70.0 m ”, airframe length - 18.6 m, empty weight - 1400 kg, maximum flight weight - 3200 kg, maximum speed - 135 km / h, landing - 18
Human.

KC-20

At the end of June 1941, under the leadership of D.N. Kolesnikov and P.V. Tsybin, the development of the KTs-20 airborne cargo glider began. The first two prototypes were ready in October 1941. After flight testing of the prototypes at a woodworking plant near Kazan, mass production was launched.

The glider was made of wood, had a spaced tail and a tricycle landing gear with a tail wheel, doors and

the windows were located on both sides of the fuselage, the cockpit located in the bow was tilted up during loading and unloading. Initially, it was planned to install a machine-gun turret on the airframe, but later it was abandoned. Landing was carried out on a combined ski and undercarriage wheeled landing gear, however, the KC-20 could, if necessary, take off and land without take-off and landing devices, that is, directly on the bottom of the fuselage. The serial machine took on board 20 soldiers or 2200 kg of cargo, for the period 1942-1943. 68 copies of the KC-20 were built.

Characteristics of the KTs-20: crew - 2 people, wingspan - 23.8 m and its area - 55.2 m, airframe length - 14.12 m, height - 2.84 m, empty weight - 22,050 kg , landing - 20 people.

Gliding cargo platforms

One of the numerous developments of the Experimental Institute P.I. Grokhovsky had devices for non-parachute landing of people and dropping cargo, the so-called airbuses.

The airbus is a flat container in the form of a short and thick wing, which had a two-wheeled chassis with rubber cushioning in the nose of the airbus and conventional aircraft crutches in the tail. Paratroopers, weapons or equipment were supposed to be located inside the airbus. After dropping from a height of no more than 12-15 m, the apparatus had to first glide and then roll on wheels (summer airbus G-68) or glide on skis (winter airbus G-76). Airbuses were intended for dropping the first wave of troops, reducing the time spent by carrier aircraft under enemy fire.

Cargo airbuses were designed for different capacities. For example, in 1932, the Air Force Research Institute was testing the cargo air bus G-21 for 125 kg. Two such devices were hung under

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R-5 wings. In the conclusion after the tests, it was written that the G-21 "may be approved for service with the Air Force of the Red Army and serial construction." Airbus G-51 was designed to drop cargo weighing up to 1000 kg.

There were projects of landing airbuses - summer for 11 people and winter for 16 people. Airbuses were developed

snowmobile. It was assumed that immediately after landing, the crew would start the engine, after which they could perform a combat mission on the ground as a high-speed vehicle with fire support. One of the options was the "air tankette" - an armored air bus on caterpillar tracks with its own engine.

P.I. Grokhovsky also proposed a marine air bus - a landing motor boat G-48 for dropping from a TB-I bomber on a low-flying flight. The boat intervened 14 people and was armed with a Maxim machine gun. An experienced 06 sample was built and tested, but it crashed during a reset.

However, the works of P.I. Grokhovsky on the development of means for parachuteless landing of people and cargo did not attract the attention of the military leadership.

PSN-1/PSN-2

In 1933, at the Scientific Research Marine Communications Institute (NIMIS), in laboratory No. 22 specially created for this purpose, under the leadership of Solomon Fedorovich Valk, the development of remotely controlled gliders carrying an explosive charge or torpedo began. In 1933-1934. launches of models were carried out in '/, natural size from a height of 1100 m, during which they flew 10-11 km. Then an agreement was concluded with the Oskonburo P.I. Grokhovsky for the development of special samples designed against ships and coastal bases:

a) DPT (long-range gliding torpedo), code designation "Wolf", - a gliding torpedo (PT, plan-torpedo) without an engine with a flight range of 30-50 km;

6) LTDD (long-range flying torpedo) - anti-aircraft gun equipped with an engine (piston or rocket) with a flight range of 100-200 km;

c) BMP (towed mine glider), code designation “Vepr” – non-engine anti-tank gun in a rigid tug behind the carrier.

The production of an experimental batch of anti-tank guns was entrusted to the Design Bureau of Plant No. 23 in Leningrad, and the creation of the guidance system (code designation Kvant) was entrusted to Research Institute No. 10 of the People's Commissariat of the Defense Industry (NKOP). In 1935, Plant No. 23 manufactured the first 4 hydrogliders, which were named PSN-I (glider

special purpose). In August, control towing of PSN-I was carried out in Leningrad without uncoupling behind the R-5 aircraft.

Full-scale flight tests of the PSN-1 were carried out with TB-3 carrier aircraft and R-6 towing aircraft on a lake near Krechevits (Novgorod Region). The first takeoff of the TB-3 aircraft with the PSN-I suspended under the right wing console with training bombs took place on August 30, 1935. It should be noted that at the prototype stage the gliders had a cockpit for the pilot, who monitored the automation . He did not interfere with the autopilot and other mechanisms, if it was not necessary. In the future, after working out the telemechanical guidance system, it was planned to make unmanned PSN-1.

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However, the manned version of the PSN-1 was also supposed to be used, but not at all for suicidal attacks, as some authors fantasize. The manned version was actually intended for visual guidance of the glider on a large target (battleship or coastal base). After dropping a warhead or a torpedo, the pilot had to take the glider aside for a distance of 4-6 miles and put it on the water, then the wing panels were unfastened, and the glider turned into a kind of boat. Using the outboard motor available on board, the pilot moved away from the hit target. That is why PSN-1 was carried out in the form of a hydroglider. By August 10, 1936, tests and acceptance of the first four PSN-I were completed. The range of their planning with various cargoes averaged 27 km.

It should be noted that the option of returning the airframe to the carrier aircraft according to the “Link” method by V.S. Vakhmistrov. Another constructive version of the glider involved the installation of an engine on it, which, in fact, turned the glider into an outboard torpedo bomber.

In 1937-1938. It was planned to manufacture a small series of PSN-I for the final development of flight ballistics through experimental launches from a carrier aircraft. However, at that time, repressions began, many employees of OKB No. 21 and the plant were arrested. As a result, the government order for the production of a series of gliders was disrupted. By order of the NKOP, OKB No. 21 was liquidated, and some of its employees were transferred to the Ostekhbyuro, test bases in Krechevitsy and

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Lake Ilmen was also eliminated. By the autumn of 1937, only three experimental gliders remained, with which they continued testing. In August 1938, test flights were carried out with automatic landing of the glider on the water. A total of 38 such flights were performed under the program.

In June 1939, a decision was made to design a new airframe, which received the designation PSN-2, in two versions - fuselage and two-beam. PSN-2 could carry a FAB-1000 bomb weighing 1000 kg or a torpedo of the same weight. Initially, it was planned to use TB-3 aircraft as a carrier aircraft for PSN-2, and later DB-3 aircraft, but the mass production of the latter aircraft was postponed several times.

The first prototype PSN-2 was built at the end of 1939. Structurally, the airframe PSN-2 developed by V.V. Nikitina was a two-float hydroglider-monoplane with a low wing and a suspended torpedo. An autopilot is included in the airframe control scheme, which the pilot could use at will during tests. Automatic airframe control devices were located inside the fuselage and partly in the center section. Access to them was provided through special hatches. The cockpit, like the PSN-1, was provided only on prototypes and was located in the forward fuselage. Preparations for testing the PSN-2 began in June 1940.

The work plan until the end of 1940 provided for testing both the first combat PSN-2 and the experimental PSN-I for the accuracy of hitting the target. In the same year, it was planned to launch combat models of PSN-2 into a series, and a decision was made to organize a training center for training specialists in maintenance and their use in the troops. At the same time, constructive improvement of plan-torpedoes was carried out, for example, a “tailless” hydroplane DPT with a suspended torpedo was developed. Projects of “flying wing” torpedoes were worked out in two versions: a manned PPT (training and sighting with full automatics) and an unmanned BPT (with full automatics). By the beginning of 1940, a project was presented for an unmanned flying torpedo with a flight range of over 100 km and a flight speed of up to 700 km/h, designed to be suspended under a DB-3 aircraft.

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In July 1940, they conducted towing tests on water and in the air of the first type of PSN-2. On trials on July 11-23, 1940, 3 towings on water and 10 towings for the MBR-2 with

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separation from the water and flight in tow at an altitude of 275 m. In the future, S.F. Valk intended to install a rocket engine on the PSN-2. However, on July 19, 1940, by order of the People's Commissar of the Navy Kuznetsov, all work on plan-torpedoes was stopped, S.F. Valka seconded from | October 1940 as a student at the Voroshilov Naval Academy, and the finished PT samples were handed over to the warehouse.

In 1944 V.S. Vakhmistrov proposed a project for a telemechanical glider based on a glider with a control plane mounted on its back. The glider was made according to a two-beam scheme, with a 1000-kg bomb placed in each beam. The takeoff of the hitch was carried out using a resettable starting cart. Having delivered the glider to a given area, the aircraft carried out aiming, unhooked the glider, and returned to base itself. After uncoupling from the aircraft, the glider-projectile was to fly towards the target using a gyroscopic autopilot. However, the project was not implemented.

Characteristics of PSN-1: wingspan - 8.0 m, length - 8.9 m, height - 2.02 m, takeoff weight - 1970 kg, maximum speed - 350 km / h, dive speed - 500 km / h, range - 30-35 km.

Characteristics of PSN-2: wingspan - 7.0 m and its area - 9.47 m?, length - 7.98 m, height on floats - 2.8 m, takeoff weight - 1800 kg, maximum speed - 600 km / h, practical ceiling - 4000 m, range - 40-50 km.

Knapsack glider MAI

In 1935, a backpack glider was developed at the MAI (wings for parachutist gliding designed by N.S. Smirnov). Structurally, the glider was a telescopically folding tube forming the leading edge of the wing of the glider, with swivel washers at the ends. The axis of rotation of the end washers coincided with the axis of the pipe. From the leading edge of the pipe, which was attached to the shoulders of the pilot, the flexible skin of the wing went to his feet, forming a triangular wing in plan with the top cut off at the pilot's feet. wingspan -

2.2 m. Triangular end washers measuring 0.35 x 0.33 m had handles for which the pilot held and controlled the flight, setting the end washers relative to the air flow at different angles of attack.

For the first time, the backpack glider was tested by the head of the air force research institute G.A. Schmidt, this happened on April 17, 1935. Having jumped from a U-2 aircraft from a height of 1500 m at a speed of 72 km / h, G.A. Schmidt made a gliding flight lasting 45 seconds, during which time the tester flew a horizontal distance of more than | km. At an altitude of 600 m, he folded the telescopic tube with the help of end washers, moving the glider into a convenient position for opening the parachute. Further, opening the parachute, he made a landing.

Wings for skydiver gliding became the prototype of modern paragliders.

SAM-23

Landing glider CAM-23 designed by A.S. Moskaleva was designed taking into account the operating experience of the AM-14 airframe. SAM-23 was carried out according to a two-beam scheme, had a short fuselage and a two-fin plumage. The fuselage housed the pilot's cabin and the cargo compartment. The rear fuselage fairing was made folding. The landing gear of the glider consisted of two shock-absorbing skis with drop-off take-off wheel carts and two tail spikes.

The construction of the airframe was completed at the beginning of 1945; it successfully passed flight tests. The glider could freely accommodate 22 paratroopers, a tankette, a light car or a cannon

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armament. SAM-23 was put into mass production, but the end of the war changed everything, and the glider was not mass-produced.

12. FLYING TANKS

At the end of the 20s. the idea of transferring tanks by air was born, and then the idea of creating flying tanks. At that time, it seemed that they would certainly be applied in one form or another in the face of the deteriorating situation in the world. Here is how the American designer W. Christie painted a picture of the future use of flying tanks: “The battle is in full swing. Something appears on the horizon that looks like a squadron of attacking aircraft. It suddenly becomes clear that the slowly descending vehicles are nothing more than armored tanks equipped with wings. They drop to the ground. The wings are dropped, and a squadron of 4-ton tanks goes on the attack, sowing death all around.

Realizing this idea, W. Christie in 1932 developed a flying tank. A tank weighing 5 tons was equipped with a biplane box, to which a cruciform tail was attached to two tubular beams. A propeller with a gearbox was installed on the leading edge of the upper plane. When taking off, the tank accelerated for the first 70–80 m as usual, on tracks, then the driver (he was also a pilot) switched the engine drive to the propeller, after which, after running another 90–100 m, the tank took off from the ground. The landing of the flying tank was carried out on a tracked chassis, in which all wheels were equipped with an independent suspension with a large stroke in the vertical direction. This allowed the tank to land directly on the battlefield. After landing, the driver-pilot used a special lever to drop the wing with the tail unit. However, the problem of switching the drive from caterpillars to a propeller and vice versa turned out to be a difficult task, so after it was built

one prototype and ten more samples without wings and tail, all work on the project was finished.

Similar work was carried out at the same time in the Soviet Union. Flying tank A.N. The Rafaelian was a glider with a high landing gear, between the legs of which the BT-2 tank was fixed. On the glider, directly above the aft part of the tank, there was a pusher propeller, which was driven by the tank engine through a special transmission. After the landing of the glider, the tank was disconnected from the glider without the crew getting out, such a design solution made it possible to use the glider not only to transport the tank, but also to transport any cargo. However, by the middle of 1933, after a series of technical evaluations of the project, it became finally clear that the engine power would not be enough to provide the required flight characteristics of the airframe. Therefore further. calculations and drawings, the project did not move forward.

Another project was developed in 1933 by N.I. Kamov, the future chief designer of helicopters of the Ka family. It was a project of an autogyro tank with folding blades, which was able to land on small areas with practically no run. The tank was armored and armed with a 20 mm cannon and a 7.62 mm machine gun. The estimated flight speed of the tank was 150 km / h. A model for blowdowns in the TsAGI wind tunnel was made, but further work was stopped.

In 1937 M.A. Smalko developed a project for the MAS-1 flying tank and brought the development to the stage of a full-size layout. At the very beginning of the Great Patriotic War, O.K. Antonov began work on the creation of a flying tank KT, which successfully flew in 1942.

Work on flying tanks was carried out not only in the USSR. In 1940, the British firm Saunaers Coe developed a design for the R.1033 tank landing module, which was intended to transport tanks across the English Channel to Europe. R.1033, which had four autonomous engines and a retractable landing gear, had to take off the ground at a speed of 140 km/h and carry the tank to a distance of about 900 km. But the project did not progress further than calculations.

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The development of flying tanks at the very end of World War II was also carried out in Japan. A flying Ku-6 tank weighing 2 tons was developed there, but, unlike the Soviet KT tank, the Japanese tank could not get off the ground.

Flying tank MAS-1

In May 1937 M.A. Smalko developed the MAS-1 (LT-1) flying tank designed for ground and air reconnaissance, airborne operations, support for deep cavalry raids, as well as overcoming large natural and artificial obstacles.

MAS-1 was a vehicle of a special design, developed on the basis of components and assemblies of the BT-7 light tank and adapted for movement in the air and on the ground. On the ground, the vehicle moved using a wheeled-caterpillar propulsion unit, and retractable wings, tail, and a folding propeller unit were used for flight, which was supposed to provide the tank with a practical ceiling of up to 2000 m.

The armored hull of the MAS-1 had a streamlined shape, it was supposed to be made of rolled armor plates with a thickness of 3, 4, 7 and 10 mm, and the turret from 10 mm armor plates. The engine compartment was located in the bow of the hull, in the middle part there was a crew consisting of a driver (pilot) and a tank commander (gunner), the aft part of the hull was occupied by a transmission. The crew was accommodated in their squad in tandem, viewing slots with triplexes were used to monitor the battlefield and drive the tank.

The main weapon of the tank was a paired installation of 12-mm DT machine guns, located in a hemispherical turret of circular rotation, and one 7.62-mm ShKAS machine gun, adapted for firing through a rotating propeller using aircraft synchronizer. Telescopic optical sights were used for firing from machine guns.

The wing of the vehicle consisted of two halves - outer (armoured) and inner (retractable). The wing skin was supposed to be made of stainless steel. The outer half of the wing was attached to the tank hull and could rotate around the attachment axis by 90° back. The inner half was extended by a special mechanism, driven by the engine of the machine, and mechanically locked. The wingspan was 16.2 m, the area of the bearing surface was 32 m”,

The tail unit, which consisted of a stabilizer, keel and rudders, was attached with four beams on special carriages inside the tank and with the help of special

God's mechanism was extended and retracted simultaneously with the wings. The propeller had two metal blades, which were mounted on special axles in the hub of the screw installation, and two levers with folding mechanism rods. When using the machine on the ground, the blades were laid in special hull niches, which were covered with armored
shields using a special mechanism.

Since the suspension from the BT-7 was retained on the vehicle, the MAS-1 retained the possibility of wheel travel and was able to reach speeds of up to 120 km/h, and on tracks - up to 70 km/h. According to the designer's calculations, the cruising flight speed was about 200 km/h, the service ceiling was 2000 m, and the flight range was about 800 km. The delivery of the MAS-1 to the combat area was supposed to be in tow behind the TB-3 bomber. A full-size wooden model was made, after which work was suspended.

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At the end of 1941 OKB O.K. Antonova received an assignment to develop a tank glider, which was intended to equip partisan detachments and sabotage groups. The delivery of the device, which had the designations A-40, KT ("Wings of the tank") or A-T, to its destination was to be carried out using a towing aircraft.

Structurally, the A-40 looked like a flying Christie tank, the biplane wing box was attached to the tank hull. The tail unit, also of a biplane type with spaced keels, was attached to the wing box using two beams. The control of the rudders and ailerons of the glider was carried out in the tank, the glider control stick and pedals for controlling the rudders were added to the usual tank equipment. A compass, speed indicator and altimeter were installed on the dashboard. The tank driver, who is also a pilot, controlled the glider not through the narrow viewing slot of the tank, but through a special optical device. The lock for fastening the towing cable was placed on the tank. During the flight, the tank turret turned back with a cannon to reduce air resistance. After landing, the driver, by turning the handle located in the cockpit on the right, disconnected the airframe control wiring, dropped the wings, and the tank could immediately go into battle.

The glider was built in April 1942 in Tyumen, after which it was transported to the village of Stakhanovo (now the city of Zhukovsky) for further testing. The tests, in which the T-60 tank participated, began on August 7, 1942 at the LII. Initially, runs were practiced on the ground in order to assess the strength of the tank tracks when driving in takeoff or landing modes. The test pilot was S.N. Anokhin, the glider was towed with the help of a TB-3 bomber. After a few days of testing on the ground, permission was obtained for the first flight. The flight task included flying in a circle in a tow at an altitude of 1500 m, uncoupling the glider on the second circle and performing autonomous gliding.

The first flight of the CT took place on September 2, 1942, towing was carried out at a speed of 130 km/h. But due to the fact that the tank did not yet have a fairing, towing was carried out at the maximum power of the engines of the TB-3 aircraft, which is why they began to overheat. In this situation, the pilot of the tug aircraft P.A. Eremeev decided to unhook the CT in the area of the nearby airfield Bykovo. Anokhin safely landed the CT, started the tank's engine and, without dropping its wings, slowly sent it to the command post of the airfield. The airfield flight director, who was not warned by anyone, saw an unusual device, raised security on combat alert, and the test pilot who got out of the car was detained. The incident was resolved with the arrival of the LII rescue team, after which the tank returned to the LII airfield under its own power. In general, the flight was carried out successfully, and the idea of airlifting the tank proved to be fully feasible.

To continue the test program, a more powerful Pe-8 tug was required, but all of them were taken in combat operations, and there was nothing to tow the winged tank. Soon the flying tank program was cancelled.

Characteristics of the A-40: wingspan 18.0 and their area - 85.8 m2, airframe length - 12.06 m, empty weight - 2004 kg, takeoff weight with the T-60 tank - 7804 kg, takeoff speed - 160 km / h, landing speed - 110 km / h.

Characteristics of the T-60: crew - 2 people, weight - 6.4 tons, length - 4.1 m, width - 2.3 m, height - 1.75 m, engine power GAZ-202 - 70l .With. (52.2 kW), maximum speed on the road - 42 km / h, armament-- | x 20-mm gun TNSh-20 and | x 7.62 mm machine gun, armor thickness - 35 mm (hull forehead) and 25 mm (turret forehead).

13. SUBMARINE AIRCRAFT AND FLYING SUBMARINES

The idea to use seaplanes from submarines first came up with the Germans during the First World War. In 1915, the EE 29 aircraft, installed across the deck in the bow of the submarine 0-12, was delivered to the coast of England. The plane was launched 30 miles from the coast, after which it made a reconnaissance flight over Kent and

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returned safely to his submarine. Soon the Germans began to use aircraft to attack enemy targets on the coasts of England and France, while the aircraft were equipped with a bomb load of up to 12 kg. One of the raids took place on the outskirts of London. Three British planes went up to intercept, but the German plane managed to get away from them.

The British at that time had the problem of fighting German airships of the Zeppelin type, which in 1915-1918. made regular raids on the British Isles. In the English Channel, British ships with interceptor aircraft on board were constantly patrolling. In 1916, the E-22 boat was adapted for these purposes, in which two Sopwich aircraft were installed behind the wheelhouse along the deck. The main task of the E-22 was to deliver aircraft as close as possible to the bases of the German Zeppelins. However, the boat with the planes fixed on the deck was an easy prey for the enemy. Some time later, E-22 was sunk by a German boat (0-18.

In the 20s. The British, taking into account the sad experience of the combat use of the E-22, developed the M-2 boat with a sealed hangar

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on the deck, in which, during the trip, the folded biplane Re) was placed, created by the Ragpa! company. In 1932, the M-2 boat sank during a training trip.

Work on the creation of aircraft for submarines intensified in the prewar period. Experimental aircraft were built and flight tested in the USSR (SPL), USA (X5-1 and M5-I) and Poland (A-2), but none of these aircraft was put into service in their countries. Aircraft developed in France (MV.411) and Italy (M.53 and R.8) were adopted by separate submarines (Zigsosh of the French Navy and Epogue Negatovsa of the Italian Navy) in the pre-war period and took part in combat operations in the first half of the war. And only in Germany (Ag 231, GA 330 and ÿi 87) and Japan (E6YI, EUML1, E14U1 and M6A1) aircraft for submarines were used until the end of the war.

SPL

In 1931, I.V. Chetverikov developed a project for an aircraft for submarines, which received the designation SPL. In 1934-1935 NIIGVF built two prototypes of the aircraft. The first copy, built as an amphibious aircraft and designated OSGA-101, passed flight tests both on land and on water. The second copy, completed by the end of 1934 and designated SPL (“Hydro-1”), was undergoing flight tests in Sevastopol until the end of August of the following year. When folded, the aircraft was stored in a container with a length of 7.45 m and a diameter of 2.5 m. In 1936, the SPL took part in the international aviation exhibition in Milan; 100 km - 170.2 km/h, and on October 7 - a distance record (480 km) and a record practical ceiling (5400 m). However, this work was not further developed.

Characteristics OSGA-101: crew - | man, power plant - I x M-11 with a capacity of 100 liters. With. (75 kW), wing span - 11.4 m and its area - 17.0 m?, aircraft length - 7.6 m, empty weight - 630 kg, maximum takeoff weight - 880 kg, maximum speed - 170 km / h , range - 400 km, service ceiling - 3500 m, flight duration - 3 hours.

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Characteristics of the SPL: crew - 1 person, power plant - 1 x M-11 with a capacity of 100 liters. With. (75 kW), wingspan - 9.6 m and its area - 13.4 mg, aircraft length - 7.4 m, empty weight - 592 kg, maximum takeoff weight - 879 kg, maximum speed - 186 km /h, range - 480 km, time to climb 1000 m - 3.9 minutes, service ceiling - 5400 m, flight duration - 2 hours.

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LPL

In 1934 B.P. Ushakov proposed the idea of creating a flying submarine (LSU), after working out several options, on January 10, 1938, the preliminary design of the boat was considered. The flying submarine was designed to destroy enemy ships on the high seas and in the waters of naval bases protected by minefields and booms. Having discovered the enemy ship during the flight, the LPL went beyond its visibility and landed on the water, after which it carried out an attack in a submerged position.

One of the significant advantages of LIL in comparison with traditional boats was the possibility of re-entering the target. The action of flying submarines in a group should have been especially effective, since theoretically three such vehicles created an impenetrable barrier up to 9 miles wide on the enemy's path. The LIL could penetrate the harbors and ports of the enemy at night, dive, and in the daytime conduct surveillance, find direction of secret fairways and, if possible, attack.

The LPL design provided for six autonomous compartments, three of which housed AM-34 aircraft engines with a capacity of 1000 hp each. With. every. They were equipped with superchargers that allowed boosting in takeoff mode up to 1200 hp. With. The fourth compartment was residential, designed for a team of three people. It also controlled the ship under water. In the fifth compartment there was a rechargeable battery, in the sixth compartment there was a propeller motor with a capacity of 10 liters. With. The body of the LIL was a cylindrical structure 1.4 m in diameter made of 6 mm thick duralumin. The boat had a pilot's cabin, which, when submerged, was filled with water, while the flight instruments were battened down in a special shaft.

The skin of the wing and tail was made of steel, and the floats were made of duralumin. Torpedoes were hung under the wing consoles on holders. The immersion process included four stages: battening down the engine compartments, shutting off the water in the radiators, transferring control to underwater, and transferring the crew from the cockpit to the living compartment (central control post). However, the work did not go further than the project. .

LPL characteristics: crew - 3-4 people, take-off weight - 15,000 kg, maximum speed - 185 km / h in the air and 2-3 knots under water, power plant - electric motor with a capacity of 10 liters. With. (7.5 kW), armament - 2 torpedoes, flight range - 800 km, cruising range - 20 miles on the surface and 18 miles under water.

PG-69

In 1936, under the leadership of P.I. Grokhovsky, the development of a rubber aircraft for submarines began. This project was the logical conclusion of a series of works by P.I. Grokhovsky over inflatable gliders, started at the Experimental Institute in 1934. According to the original idea of the author, rubber gliders were intended for climbers - "mountain paratroopers". After landing, they could be collected, rolled up, put into a bag and returned to base by a small plane. One of the tested rubber gliders was demonstrated to members of the government at a parade in Tushino.

The most developed pneumatic amphibious glider named after the X Congress of the All-Union Leninist Young Communist League weighed 77 kg, fit into a bag with dimensions of 1.0 x 1.0 0.5 m, could be ready for flight in 20 minutes using a foot air pump. During the tests, the glider was towed by a U-2 aircraft at an altitude of 60-100 m. After uncoupling, it flew in a straight line for more than a kilometer, landing on the ground or water.

The soft folding reconnaissance aircraft for submarines received the designation PG-69 (pneumatic Grokhovsky) and was included in the work plan of the pilot plant of the Experimental Institute for 1936. The working project provided for the construction of an experimental inflatable

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aircraft weighing 290 kg, which fit into a hangar on the deck of a submarine 4 m long and 1.5 m in diameter. Crew - 1 person

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the Czech engine "Prague" with a capacity of 40 liters was used as a power plant. With. The wing and tail section of the fuselage were made of rubberized multilayer percale. The front part of the fuselage and the cockpit were made of wood, the power plant, wing struts and control system were made of metal. The practical ceiling was: without air pumping in flight - 500 m, with air pumping in flight - 2000 m.

The plan provided for the completion of the construction of the PG-69 in June 1936 and flight tests before the end of the year. However, with the disbandment of the Experimental Institute, all work on the PG-69 ceased. The further fate of PG-69 is unknown, since the institute's archives burned down during the siege of Leningrad.

Twenty-three years later, in 1959, a similar pneumatic aircraft was developed by order of the CIA at the American company Coodweag. The aircraft was intended for secret delivery of agents to a given area or evacuation from there. Structurally, the aircraft consisted of a wing, a tail module and a cockpit, made of a two-layer rubberized fabric. The preparation of the machine for flight was carried out by one person using a compressed gas cylinder, this operation took about 6 minutes. The assembled aircraft could take off both from the ground and from the water, using the ventral ski. It was equipped with a 40 hp engine. with., which set in rotation a pulling two-bladed propeller. The aircraft had a length of 6.0 m, a wingspan of 5.5 m, a maximum speed of 115 km/h and a flight range of about 550 km.

14. Convertiplanes and ring planes

Attempts to build an aircraft that could take off “like a helicopter” began to be made even at the dawn of the development of aviation. Russian design engineer Boris Grigoryevich Lutsky, known for numerous inventions in the field of engine building and transport, built in 1909 an aircraft - a helicopter (rotorcraft). It was an aircraft with two tandem wings, equipped with two engines with a power of 50-60 hp. With. One of the propellers drove the pulling propeller, and the second - two main propellers located between the wings with tiltable axles. They were intended for vertical takeoff and landing, as well as for controlling the aircraft in roll and yaw. The device had good “aircraft” characteristics, but attempts to take off “like a helicopter” did not justify the designer's hopes. |

One of the first aircraft in the world with an annular wing was the airplane of the Frenchman M. Zhivodan. This apparatus, created in 1909, had two annular wings (front and rear) mounted on the ends of the fuselage. In 1910, an experimental apparatus with an annular wing was built by the American W. Gary.

In the 30s. In the Soviet Union, intensive studies of vertical take-off and landing aircraft were carried out under the guidance of Academician B.N. Yuriev at MAI and VVIA named after N.E. Zhukovsky.

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"Falcon"

In 1936, MAI student F.P. Kurochkin (supervisor Professor B.N. Yuryev) completed the diploma project of a twin-rotor VTOL fighter “Sokol” with a rotary wing (tiltrotor).

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In the middle part of the fuselage, behind the cockpit, there was a Hispano-Suiza 12] BB$ engine with a capacity of 860 hp. With. In the forward part of the fuselage there was a radiator of the engine cooling system with a fan for blowing the radiator in the mode of hovering in the air. Engine power through the transmission was transmitted to. lifting and sustainer four-bladed propellers with a diameter of 4 m, which were located on the rotary tips of the wing consoles. Instead of a tail stabilizer, the fighter had a propeller with a diameter of 2 m, which rotated in a horizontal plane. The presence of a two-speed central gearbox in the transmission ensured the maximum efficiency of propellers, both in hover mode and in level flight mode.

The landing gear of the aircraft was four-post, the main wheel strut was retracted into the fuselage, the tail skid was also retracted in flight. In the parking lot, the side supports were the tail parts of the fairings of the slewing gearboxes of the lifting and sustainer propellers, equipped with shock absorbers.
The Falcon had a takeoff weight of 1850 kg, a wingspan of 5.8 m.

The Sokol tiltrotor project was not implemented, however, after the war, in 1946-1947, in the VVIA named after N.E. Zhukovsky by engineers F.P. Kurochkin and V.N. Tyrone under the leadership. Academician B.N. Yuriev, a number of projects of single-seat fighters KIT-1 and KIT-2 were carried out, which were supposed to take off with a vertical fuselage (from the tail) and use propellers to create vertical thrust. However, the projects were not implemented due to the unusual technical solutions and the associated high technical risk.

Characteristics of the "Falcon": crew - 1 person, power plant - 1 x "Hispano-Suiza" 12ÿBE5 with a capacity of 860 liters. s., wing span - 5.8 m and its area - 9.28 m?, area swept by screws - 25.12 m?, length - 7.53 m, height - 2.67 m, takeoff weight - 1850 kg.

Aegovistorÿsp

In 1937, in Yugoslavia, work began on a tiltrotor project similar in design to the Sokol tiltrotor. The author of the project was the Russian emigrant N.I. Zhuchenko. In 1939, a prototype machine called Ago$bayur!ap was built. In September 1939, its tests began near Belgrade, but they immediately ran into problems - the low thrust-to-weight ratio of the tiltrotor and the unreliable operation of the wing turning mechanism. When trying to take off into the air, the car trembled and vibrated, but it never took off from the ground; serious improvements were required in the design of the Aerostatoplane. After unsuccessful attempts to tear the car off the ground, the Yugoslav Air Force, in the conditions of the outbreak of war, refused to further finance the project. The plane was destroyed in April 1941 when German troops entered Belgrade.

Characteristics of Aegozt!orap: crew — | man, power plant — | x Mabeg MZhgop with a capacity of 50 liters. s., wingspan - 6.7 m, length - 5.78 m, empty weight - 355 kg, take-off weight - 425 kg, maximum speed - 200 km/h, service ceiling - 5000 m.

"Ringplane"

In 1936 MAI student M.V. Sukhanov completed the graduation project of an annular wing aircraft. After graduating from the institute, M.V. Sukhanov, taking his graduation project as a basis, developed the design of the Koltseplan fighter-interceptor. In the pre-war year, this project was reported to the Air Force command and considered at the scientific and technical council of TsAGI. After the start of the war, a group was formed in the Novosibirsk branch of TsAGI, which was engaged in the design of the Koltseplan aircraft, and in 1942 M.V. Sukhanov received an inventor's certificate for the invention of a short takeoff and landing aircraft with an annular wing.

The Ring Plane was equipped with an M-22 engine that drove two coaxial propellers and had a normal tail. Ailerons were mounted on pylons that connected the wing with

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fuselage, the landing gear was tricycle, the main struts were retracted into the wing. The aircraft had good anti-spin characteristics, high maneuverability and

the ability to fly at angles of attack of the wing up to 43°, which, with a sufficiently high power-to-weight ratio of the fighter, allowed it to take off almost vertically. The model of the “Ring Plane” built in Novosibirsk successfully flew, but before the construction of the prototype it didn't work out.

Characteristics of the Ring Plane: crew — 1 person, power plant — | x M-82 with a capacity of 1600 liters. with., the diameter of the ring - 3.0 m and its area - 10.5 m?, the diameter of the coaxial propellers - 3.0 m, maximum speed - 740 km / h, take-off weight - 2500 kg.

"Helicopter plane"

In 1944, a graduate student of the Tbilisi Aviation College Sh.N. Khutsishvili sewed up a graduation project on the topic “Aircraft of a special scheme”. In the graduation project, the “Helicopter-plane” was developed - a single-seat fighter with two engines, a rotary wing and propellers with a diameter of 5 m. Thanks to this diploma, in the same 1944, technician Sh.N. Khutsishvili was enrolled at the MAI without entrance exams. In 1947 Sh.N. Khutsishvili proposed another VTOL project with rotary engines at the ends of the wings, rotors of an even larger diameter and a smaller load on the area swept by the propeller, which brought it closer to the standards of a helicopter. However, the projects of Sh.N. Khutsishvili was not realized.

Luftwaffe projects

In the prewar years, work on the design of convertiplanes and aircraft taking off from the tail began in Germany. In 1938, at the Wesserflug company, under the guidance of designer Simon, they developed a tiltrotor (project No. R.1003), which resembled the Sokol according to the scheme. An OV 600 was used as an engine, which rotated two propellers with a diameter of 4 m, mounted on the rotary end parts of the wing. During takeoff, the rotary parts of the wing turned up with screws, after installing them in their usual position, the aircraft switched to horizontal flight. Things did not go further than the project, for some time all work on convertiplanes in Germany stopped.

However, in the second half of the war, when the Loftwaffe had problems with a lack of runways in the face of massive Allied bombing strikes, German aircraft designers returned to the development of vertically taking off aircraft. In 1943, G. Focke developed a draft of the Ea 269 tiltrotor aircraft. In September 1944, at the Focke-Wulf company, designer H. von Halen designed the Ru Tpebziger aircraft, which took off from the tail. A feature of this aircraft was a three-bladed rotor rotating around the fuselage, and a ramjet was installed at the end of each blade. We remind the reader that such a propeller installation scheme was developed by V.N. Belyaev and was used as early as 1939 in the design of the EI fighter.

The project of the VTOL interceptor Ne ÿeÿre (“Osa”) with an annular wing (ring-plane) around the middle part of the fuselage was developed in 1944. The wing was attached to the fuselage with the help of three pylons. An OV RTI 021 or Nez 021 engine with a capacity of 2000 hp was installed in the rear part of the fuselage. s., which rotated a six-bladed propeller located inside the wing. The engine air intake inlet was located in the forward fuselage. The pilot was seated in the cockpit during level flight, so

takeoff and landing, he was lying on his back.

The vertical takeoff and landing ring interceptor Ne Gegsye P ("Lark") was designed from February 25 to May 8, 1945. It was similar to the Mezra project, but with two engines -

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mi OV 6050, each of which rotated a three-bladed propeller. The pilot in level flight in the cockpit was lying down.

All of the above German projects were not implemented until the end of the war.

Post-war projects

- In 1954, the MAI developed a project for a vertically taking off airborne transport aircraft (chief designer I.P. Bratukhin). The aircraft took off from the tail, four turboprop engines were located in nacelles at the ends of the wings of low aspect ratio, the consoles of which were located at right angles to each other. The landing gear was four-support, with non-retractable supports on the wing consoles, with twin wheels. The take-off weight of the aircraft was 50–60 tons.

Studies on free-flying models showed that it is very difficult to control a device that changes the position of the fuselage in flight, so in the Soviet Union, in further research, they focused only on the schemes of aircraft that perform vertical takeoff and landing with a horizontal position of the fuselage.

Intensive work on convertiplanes and tail-taken aircraft began after the war in the United States, the following firms worked in this area: Lockheed (XGU-I Zatop), Konvzr (HEU-1 Roro), Ryan (X- 13 Meshe(), Bell (XU-3, Model 65, XU-15, X-22A, U-22), Hiller (X-18, XC-142), Curtiss-Wright (X-100).

In France, Snekma developed the S.450-01 Co! eoriege ring wing, and Nord developed the Sade tiltrotor. In Canada, the Canader company worked on the ST-84 tiltrotor.

All these works in the USA, France and Canada ended only with the construction of prototypes. The only exception is the Bell U-22 convertiplane, 523 of which were ordered for the Air Force, Navy, and the US Marine Corps. The U-22 tiltrotor entered service in 2005; it is in service with the 160th Special Operations Squadron.

15. LICENSED, LEND-LEASE AND CAPTURED AIRCRAFT

In the 30s. The Soviet government, taking measures to strengthen the country's defense, including measures to raise the production of aircraft and engines for them to a new, higher level, went to purchase aircraft abroad for licensed construction (Valti U -11, "Douglas" OS-3, "Consolidated" RVU-1, "Glenn-Martin" 156, etc.), purchase of equipment, documentation, technology, etc.

At the beginning of the war, the Soviet Union, which not only suffered heavy losses of aviation equipment, but was also forced to evacuate most of its aircraft factories to the Urals and Siberia, turned to the allies for help in supplying aviation equipment. The official decision to supply Lend-Lease aircraft to the USSR was made by the United States on November 7, 1941.

Lend-lease (eng. ÿepa-ÿÿÿÿÿ, from ÿÿÿÿ — to lend and ÿÿÿÿÿ — to lease) was originally intended to provide assistance to England and the countries of the British Commonwealth by transferring military equipment, weapons, ammunition, equipment, strategic raw materials, food, various goods and services. The Lend-Lease Law was adopted by the US Congress on March 11, 1941, and the agreement between the USA and the Soviet Union on Lend-Lease supplies was signed on June 11, 1942, although actual deliveries began in November 1941. According to official data At the end of September 1945, the United States delivered 14,018 aircraft to the USSR, for comparison: England and its Commonwealth states received more than 38,800 American aircraft of various types. Great Britain, in turn, exported part of its Lend-Lease aircraft to the USSR,

quantity

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The number of these aircraft amounted to 4570 copies. Considering that the aviation industry of the USSR during the war produced 115,596 aircraft of various types, lend-lease deliveries from the USA and England did not exceed 16%.

Deliveries of goods from the USA, Canada and Great Britain to the USSR were carried out along 8 routes. The earliest one, across the North Atlantic to Murmansk and Arkhangelsk, was opened already in August 1941. The northern convoys were a very risky operation, German submarines and torpedo bombers sank about 80 ships from the convoys, about 10% of the shipped cargo did not reach the Soviet Union. Nevertheless, the northern one: the route continued to operate, about 20% of Lend-Lease cargo was transported along it.

Far Eastern routes were considered less dangerous: by sea to Vladivostok, Petropavlovsk-Kamchatsky, Magadan, Nakhodka and Khabarovsk, and then through the entire USSR by rail (over 50% of cargo). However, the use of the Pacific Lend-Lease routes was fraught with great risk. Despite the existence of the Soviet-Japanese neutrality pact, Japan, a loyal ally of Nazi Germany, closed the ice-free Sangar Strait to the passage of Soviet ships, and another ice-free Strait, Korea, was under the control of the Japanese fleet.

Ships sailing under the Soviet flag were searched by the Japanese coastal services, detained by them and the ships of the Japanese Navy, and some were sunk. So, in 1941-1944. 178 Soviet ships were detained, some of them for two or more months, about 25 Soviet ships were sunk by the Japanese Navy and German submarines. About 20% of cargo was delivered by sea, and then by road and rail transport through Iran, and then Armenia, Kazakhstan and Azerbaijan. Up to 10% of cargo arrived through the Black Sea and the Arctic. |

Approximately 80% of the delivered aircraft flew to the USSR on their own through Alaska and Chukotka, and then through Siberia. Hundreds of them crashed along the way. Some types of aircraft came to our country by unofficial means — they were picked up after forced landings in Europe or interned in the Far East. During the war, captured German aircraft were operated in small numbers.

A-20S

A prototype light bomber A-20 (OV-7) of the American Douglas company first flew on October 26, 1938. Under the Lend-Lease agreement, the A-20 under the name Bovoop MK SHA was supplied to the Air Force. Great Britain, in 1942 Lend-Lease deliveries of A-206C aircraft to the USSR began.

Two regiments of long-range night fighters of long-range aviation were among the first A-20S to be put into service. The same aircraft were handed over to the naval aviation for use as sea attack aircraft. In the autumn of 1943, a small special group was formed at the 2nd Guards Aviation Corps of the ADD, armed with A-200s. The targets for strikes by the special group were German airfields located in occupied Belarus. On average, two or three sorties were carried out from the Lipica airfield per night. Within a month, the pilots destroyed and damaged 8 railway echelons, [4 enemy aircraft on the ground and one BE 110 in the air, in addition, they defeated several convoys.

The ADD command considered the results of the combat use of the special group very encouraging, and soon, in October 1943, the Supreme Commander-in-Chief ordered the formation of three regiments on A-20C aircraft - one for the 2nd, 4th and 5th air corps of the ADD. The purpose of creating these units was formulated as follows: “...increasing the effectiveness of bombardment of railway junctions and airfields, as well as reducing the losses of our aviation from air defense systems

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and night AI of the enemy. The units received an unusual official designation "air regiments of long-range night hunters-blockers" (ap nob DD).

During 1944, the A-20S fought in the area of Sevastopol, in the Baltic States, in Belarus, destroying enemy aircraft, railway trains and suppressing air defense systems. A total of 2,771 A-20s were delivered.

Characteristics of the A-20S: crew - 3 people, power plant - 2 x Mprm K-2600--23 with a capacity of 1600 hp each. s., wing span - 18.69 m and its area - 43.11 m ”, length - 14.63 m, height - 5.36 m, empty weight - 7250 kg, take-off weight - 12 338 kg, maximum speed - 545 km/h, range — 1759 km, rate of climb — 429 m/min, service ceiling — 7864 m, armament — | cannon caliber 20 mm, 2 Vgompÿpr machine guns caliber 12.7 mm and 1814 kg of bombs.

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AT-6 Tehap

At the end of the war, a small number of AT-6 Tehap training aircraft were received, produced by the American company North American since 1935. Soviet specialists first showed interest in the Texan in 1942, on December 10 a special request was made Americans about the possibility of supplying a batch of 30 vehicles.

In the early spring of 1943, eight disassembled aircraft of the AT-6S modification arrived via Murmansk and Arkhangelsk. The first six vehicles were delivered to the 6th reserve brigade in Ivanovo, where they were assembled. One aircraft was transferred to the Air Force Research Institute, where it was tested from May 21 to June 6. The overall score for AT-6C was fairly high. It was considered very valuable that the layout of the cockpit was similar to the American fighters that came to us under Lend-Lease. Another 20 AT-6S arrived via the southern route, through Iran.

In March 1945, our representatives in the United States immediately requested 600 AT-6s, but the Americans agreed to give only 225. Now the AT-6E modification machines were sent assembled through Alaska. The first AT-6E went along the highway in June, the last group of Texans took off from Fairbanks in mid-July and reached Krasnoyarsk by the beginning of August 1945.

In total, 82 AT-6 aircraft were received, which were distributed mainly between reserve brigades and regiments engaged in retraining for imported equipment, as well as in flight schools.

Characteristics of the AT-6A: crew - 2 people, power plant - 1 x Rgac & Mipeu K-1340-49 Mazr with a capacity of 600 hp. s., wingspan - 12.8 m, aircraft length - 8.84 m, height - 3.55 m, empty weight - 1886 kg, takeoff weight - 2404 kg, maximum speed - 330 km / h, range - 1205 km , practical ceiling - 7325 m, armament - 2 machine guns of 7.62 mm caliber.

Ag 196

This two-float seaplane was created in 1937 by Arado as a shipborne ejection reconnaissance and spotter for German heavy cruisers and battleships. The first deliveries of aircraft of the Ag 196A-1 series began in July 1939, they were equipped with the battleships Reshvsapa and Adpiga! Ota! More. Before the start of the war, 18 aircraft were

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put on the cruisers 5sÿagpÿogvÿ, Speÿÿepai, Avtÿga! Shcheer, Adpiga! Nirreg, based in Kiel, and the cruisers Etdep, Kosh, Kopezegg, Garde and Mshtpbego, based in Wilhelmshaven. In 1940, the Ag 196A entered service with the coastal units of the Luftwaffe based in Northern Europe. A total of 593 aircraft were built.

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In 1940, when the USSR was negotiating with Germany to acquire the battleship Lutzow, they were going to buy two Ag 196 aircraft with it. At the beginning of 1941, money was transferred to Germany and the planes were expected to arrive in Leningrad but the war started. At the end of the war, several dozen Ag 196s were captured in the Baltic and Black Seas. Most were sent to aviation border detachments, each of which had 6–8 Ag 196 aircraft. Later, they began to replace German engines with domestic ASh-62IR engines, with which they flew until the end of the 50s. In 1951, one Ag 196 was tested at the Naval Aviation Research Institute.

Characteristics Ag 196A-3: crew - 2 people, power plant - | x VMM 132K with a capacity of 970 liters. s., wingspan - 12.4 m and its area - 28.3 m:, aircraft length - 11.0 m, height - 4.45 m, empty weight - 2990 kg, takeoff weight - 3730 kg, maximum speed — 310 km/h, range — 1070 km, service ceiling — 7200 m, armament — two 20 mm MO-EE cannons, 1 MS 17 machine gun, | machine gun MO 15 and two 50-kg bombs.

AM.41 ABegtaye

The first flight of the AM.41 Afeptape bomber of the English company Armstrong-Whitworth took place on March 20, 1940. However, later in the British Air Force these aircraft were mainly used as transport aircraft for landing troops, as well as towing cargo gliders.

In October 1942, an agreement was concluded between the British and Soviet governments on the supply of 200 copies of A.No. 41 to the Soviet Union. Aircraft were flown at high altitude along a very dangerous route through Norway, Sweden and the Baltic Sea, through the zone of action of enemy fighters.

In the Soviet Union, the first batch of 12 aircraft that arrived was subjected to rigorous testing. The conclusion was disappointing. British cars were significantly inferior

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“To domestic long-range bombers. Having become acquainted with the results of the first weeks of A.No. 41 operation in our country, the Air Force Commission recommended that they be refused further acceptance or, at least, seriously modified. Even in May 1943, the transfer of aircraft was suspended, in September the Soviet government officially refused 100 aircraft, and required 86 to be modified. But soon they abandoned the last 86 copies of AM.41.

The 12 A.M/.41 aircraft that arrived with the first batch were put into service with the 1st (later the 10th Guards) division, they served for about a year and a half. During this time, at least two aircraft were destroyed in accidents. Then the planes, which were still suitable for flights, were handed over to naval aviation. Four of them served in the 65th regiment, where they transported cargo from one rear airfield to another. In 1944, two still flying machines were transferred to the Levanevsky Higher Naval Aviation School, which was then located in the Volga town of Bezenchuk. Three more planes from Vnukovo also arrived there. All AM.41s in the school entered the training regiment of navigators. At the end of the war, two aircraft were still in service, in the fall of 1945 they

written off.

Two AM.41 aircraft ended up in the 25th reserve regiment in Azerbaijan, which specialized in retraining crews for imported equipment. They were used there as training. At least one aircraft in the regiment crashed in late 1943.

Characteristics of ÿ.ÿ.41 MCP: crew — 5 people, power plant — 2 ÿ ÿÿ5Ђÿ! Negshes XI with a capacity of 1590 hp each. s., wing span - 23.48 m and its area - 74.6 m?, aircraft length - 18.28 m, height - 4.75 m, empty weight - 10,260 kg, takeoff weight - 16,570 kg , maximum speed - 427 km/h, range - 2092 km, service ceiling - 5486 m, armament - 2 machine guns WinkKege.

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B-17

The leadership of the Soviet aviation industry tried to buy a license for the production of the B-17 bomber from the American company Boeing even before the war. In the summer of 1941, when, after the German attack on the USSR, the United States offered its military assistance, the US presidential administration

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the question was discussed about the supply of 10 heavy bombers per month by the Western allies. Five were to be provided by America, five by England. In the project, with which A. Harriman arrived in Moscow, it was written that the United States undertakes to deliver 27 such machines by June 1942.

To receive the first batch of B-17 bombers, a group of Soviet specialists arrived in the United States under the leadership of M.M. Gromov. But the Americans did not give us B-17s, instead offering B-25s, B-26s and A-29s. Another attempt to get these machines was made in 1944, when the Soviet side sent a request for the supply of 240 B-17 aircraft under the IV protocol on military assistance, but again they did not receive a single one.

By the middle of 1944, an agreement was reached on the use by the Americans of bases on Soviet territory in order to bombard targets in East Germany, Hungary and Poland. To receive American B-17 aircraft for refueling in Ukraine (in Poltava, Mirgorod and Piryatin), air bases were organized, airfields were reconstructed, equipped with collapsible metal runways, barracks and workshops were built. It was planned that B-17s from the 8th and 15th Air Forces of the US Air Force would start from their bases in England and Italy, bomb out and continue on their way to Ukraine. There they will be refueled, new bombs will be hung up and sent back. The Soviet side provided air defense of airfields, supplies and partly maintenance of aircraft.

These "shuttle" raids were carried out from June 2 to September 19, 1944. 1,030 aircraft took part in them, including 529 B-17 bombers, which dropped about 2,000 tons of bombs on the Germans. By the beginning of autumn, Soviet troops had gone far ahead, and the use of bases in Ukraine became impractical. However, damaged B-17s remained at the “shuttle” base, which it was not economically profitable for the Americans to evacuate. Moreover, as the Red Army advanced in Eastern Europe, British and American aircraft, including B-17s, made forced landings and abandoned by their crews, became increasingly common.

Therefore, it was decided to restore them on their own for further use, since heavy bombers were badly needed by Soviet aviation. Initially, work on the search and restoration of such ma

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tires were driven independently, in separate parts or formations. For example, in Hungary and Austria, the 449th Bomber Regiment was first involved in the collection and restoration of American heavy bombers. Then it was decided to complete the regiments of the 45th long-range air division with restored B-17s, then the only unit of four-engine bombers in our country - SHIKOV.

By July 1, 1944, for example, the 890th regiment from the 45th air division was armed with 12 B-17 bombers; -17C. One machine of an earlier type, B-17E, entered the LII, where it passed flight tests.

_ Characteristics of the V-17C: crew - 9 people, power plant - 4 x Mpezhÿ K-1820-65 with a capacity of 1200 hp each. s., wingspan - 31.62 and its area - 131.92 m?, length - 20.7 m, height - 4.7 m, empty weight - 13,880 kg, take-off weight - 22 520 kg, maximum speed -- 468

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km/h, range - 5471 km, service ceiling - 11,278 m, armament - 6 machine guns of 12.7 mm caliber, 1 machine gun of 7.62 mm caliber and 4760 kg of bombs.

B-25 |

The American bomber B-25 "Mitchell" of the company "North American" was delivered in 1941-1945. in the USSR in significant numbers and since the middle of the war was a significant part of the long-range aviation fleet. The first two B-25Vs arrived in Murmansk on December 20, 1941. The first batch of B-25Vs was used for training purposes.

The next batch of Mitchells of 72 B-25s was transported to the USSR via Iran in March 1942. They were ferried by civilian crews from the Pan American company, aircraft flew from the USA through Brazil, the Atlantic Ocean, Africa and the Middle East. By the end of the year, 102 V-25s were transported to the USSR in this way, and a total of 118 of these machines were delivered via Iran.

By the end of the spring of 1942, three regiments (37th, 125th, and 16th) were re-equipped with V-25s as part of the 222nd air division, which operated near Vyazma, Dorogobuzh, and Yartsevo. Many daylight sorties were made by single machines and small

mi groups without fighter cover. The targets were car and tank columns, fortified positions. As a result, it turned out that the use of the B-25 for tactical purposes was ineffective, so on September 29, 1942, the 222nd division was transferred to long-range aviation.

In the 222nd division, the Mitchells were used mainly as night bombers, striking at railway junctions, airfields, and German resistance centers. From December 1942 until the middle of summer 1943, the Mitchells operated against enemy targets in Belarus, and in September they took part in the suppression of enemy long-range batteries near Leningrad. Later, they made long-range raids on Warsaw, Breslau, Koenigsberg, Tilsit, Berlin, in 1944. The 222nd division destroyed the Debrecen railway junction in Hungary.

From the end of 1942, most of the B-25 bombers arrived from America via ALSIB (via Alaska and Siberia). In total, 870 copies of the B-25 were sent to the USSR under the Lend-Lease program, of which 861 aircraft flew to their destination. In general, at the beginning of 1944, B-25s accounted for about 10% of the ADD fleet. By the end of the same year, all ADD corps, except for the 2nd Guards Corps, had the B-25, and in the 4th Guards Corps it was the main type. By January 1, 1945, the 18th Air Force (the successor to the ADD) had 320 Mitchells, which accounted for about a fifth of all its equipment.

The B-25 was also used by us as a long-range reconnaissance aircraft. The first three aircraft of this type entered the 4th and 40th long-range reconnaissance regiments in November 1942. Subsequently, various reconnaissance regiments and squadrons of the Air Force and naval aviation had several aircraft of this type. In addition, there were Mitchells in training units, such as the training regiment of the Air Force Academy and the 1st Higher Officer School for Night Crews of the ADD.

The fate of one of the B-25 aircraft, which came to the USSR in April 1942, is interesting in an unusual way. This plane took part in the famous American B-25 raid on Tokyo. General Henry Arnold, Commander-in-Chief of the US Army Aviation, appointed Lieutenant Colonel James Doolittle, one of the most experienced test pilots, as group commander.

Lieutenant Colonel Doolittle selected a group of volunteers to take part in the flight. Since Japanese patrol ships are usually

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but located at a distance of 500 miles from the Japanese islands, then to ensure the secrecy of the operation, the B-25B bombers had to take off from an aircraft carrier at a distance of 550 miles. All unnecessary equipment was removed from the aircraft, and additional fuel tanks were installed instead to bring the flight range up to 2000 miles. Each aircraft carried four 500-pound bombs, 12.7 mm machine gun turrets were removed from them to save weight. In addition, part of the radio equipment was removed, and the expensive bombsight was replaced with a primitive self-made device. The tail turret was replaced with a wooden mock-up, which was supposed to represent machine guns.

The plan of the operation called for Lieutenant Colonel Doolittle's lead aircraft to drop incendiary bombs on Tokyo to start fires. Focusing on their flames, after 3 hours, another 12 aircraft will drop bombs, and the 3 remaining bombers will attack Nagoya, Kobe and Osaka. After the attack, the planes were supposed to fly to China and land on airfields belonging to the troops of Chiang Kai-shek. Since none of the volunteer pilots had yet taken off on a B-25 bomber from an aircraft carrier, on February 3, 1942, training flights of two aircraft took place from the deck of an aircraft carrier. On April 2, 1942, the aircraft carrier Nogpe left San Francisco! with 16 B-25V bombers on its flight deck. Note: Linked up on 13 April with the aircraft carrier Epjegrÿse, which was providing air cover, forming the 16th Task Force. This formation, in addition to two aircraft carriers, included four cruisers, eight destroyers and two tankers.

The Japanese, after analyzing the data of radio intercepts, guessed that the Americans were preparing some kind of operation. The joint headquarters of the Japanese fleet ordered the naval aviation to concentrate in the Tokyo area, as well as to put the coast guard patrol vessels on alert. Early on the morning of April 18, about 650 miles from the Japanese coast, one of the Japanese patrol ships spotted an American squadron. Although the Americans quickly sank it, but, given the likelihood of a watchdog transmitting an alarm signal by radio, Admiral W. Halsey, commander of the 16th operational formation, urgently revised the original plan, which provided for the bombers to take off at noon on April 19, and. told the group to take off immediately. Dolittle's plane blew off

from the deck first at 8:20 am on April 18, and the last plane took off at 9:20, after which the group headed for Tokyo. Immediately after the last plane took off, the carrier formation turned around and left the area at full speed, fearing a Japanese attack. |

The bomber raid took the Japanese by surprise, as they assumed that for the takeoff of the bombers, the American aircraft carriers would have to approach the coast at a distance of about 200 miles, that is, they expected an attack later. The bombers were not intercepted by fighters over Japan, and only one of them was shot down by anti-aircraft artillery fire. The raid caused little material damage to the Japanese, so it was useless from a military point of view. However, American propaganda claimed that this raid was of great moral importance for raising the morale of American soldiers, and also forced the Japanese to reorganize the air defense structure to protect Tokyo and other Japanese cities from possible American air raids. Doolittle for this raid was presented to the medal and promoted immediately to brigadier general.

The American public, seized by the euphoria of the Doolittle raid, did not know that all but one of the bombers participating in the raid were lost, as fuel supplies were not enough to reach the areas of China not occupied by the Japanese. The crews either left the plane by jumping out with a parachute, or made an emergency landing with damage to the car. Of the 75 crew members of these aircraft, 5 were killed and 10 were captured by the Japanese. The prisoners were subsequently accused by the Japanese authorities of bombing civilian targets, three of them were executed, and one pilot died in prison. Some of the pilots, including Doolittle, managed to get out of the areas occupied by the Japanese. However, the raid caused the Japanese to carry out a punitive action in China, which resulted in

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about 250,000 Chinese were killed. As for the surviving American bomber (No. 02242), having bombed, it turned off the planned course towards the territory of the Soviet Union and landed safely at the Unashi airfield in the Far East.

On April 23, 1942, the Soviet leadership officially reported this incident with the aircraft to the US President through the American Ambassador, Admiral Standley. The further fate of the aircraft and its crew developed in this way. B-25V was studied

pilots of the Air Force of the Pacific Fleet and flew around them. From Unashi, where he landed, he was transferred first to the Semenovka airfield, and then, by order, to Moscow, to the 65th air regiment of a special destination.

The American crew of the aircraft - commander Major Edward York, co-pilot Lieutenant Robert Emmens, navigator-bomber Lieutenant Norm Herndon, flight engineer Sergeant Theodore Laban and air gunner Sergeant David Paul - were first transported to the city of Okhansk, Molotov (now Perm) region, where they lived for several months. Then they were transferred to Tashkent, and from there to Ashgabat, where for some time they served American planes that came to the USSR under Lend-Lease. In the summer of 1943, the American crew was transferred to Iran, where at that time, along with the Soviet units, there were US and British military contingents. From there, the pilots returned to their homeland in the USA in a roundabout way through the countries of the Middle East, Africa and Latin America. They, as national heroes, were received at the White House by President and Supreme Commander-in-Chief F. Roosevelt.

When the Great Patriotic War came to an end, 497 Mitchells were in the Air Force. In August 1945, these machines were used in combat operations against Japan. In the Kuriles, several aircraft were also used, obtained unofficially in 1943-1945. The first four of them landed at the Yelizovo airfield near Petropavlovsk after the American air raid on Paramushir on September 11, 1943; all these aircraft belonged to the 77th Air Force Squadron of the US Army. One more bomber was added a year later, on September 17, 1944. A total of 12 B-25 aircraft landed in Kamchatka. The last of them, B-25) R. Walbrink, heavily damaged by Japanese anti-aircraft gunners, made an emergency belly landing on June 10, 1945. Several aircraft were repaired and put into operation by the 128th mixed division. On August 27, there were five B-25s there, four of them in the 903rd bomber regiment. All of them were of different modifications - C, O, C, and 7. They were used as training, to prepare for the receipt of American A-20 bombers, and also for various auxiliary purposes.

Characteristics of the V-250: crew - 5 people, power plant - 2 x MPayu K-2600-13 with a capacity of 1700 hp. s., wing span - 20.6 m and its area - 56.67 m?, length - 16.12 m,

height — 4.82 m, empty weight — 9208 kg, takeoff weight — 15,880 kg, maximum speed — 457 km/h, range — 2414 km, service ceiling — 6452 m, armament — 6 machine guns of caliber 12.7 mm and 1360 kg of bombs.

0S-3/Li-2

From the middle of 1938, the domestic aircraft industry began serial production of the PS-84 aircraft, and from September 1942 it was produced under the designation Li-2 (named after the chief engineer of the plant, Boris Pavlovich Lisunov, who led the implementation). Li-2 (PS-84) was a licensed version of the American Douglas OS-3 aircraft. In the United States, 10,692 of these aircraft were produced, and about 2,000 more were built under license in the USSR. In preparation for serial production, a lot of work was done on the processing of drawings in relation to domestic technology and the transfer of dimensions from inches to millimeters. This work was supervised by V.M. Myasishev; such work could not be carried out by Fokker and Mitsubishi,

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also purchased licenses for the production of the OS-3 aircraft and were forced to only assemble aircraft from units brought from the United States.

Li-2 had several modifications, structurally almost no different from each other. The military version of the Li-2 was a night bomber with defensive small arms and ASh-62IR engines. To protect the rear of the hemisphere, it had a turret with a machine gun (ShKAS or UBT) and two ShKAS machine guns in the sides of the fuselage. Under the center section, the aircraft carried up to 2 tons of bombs of various calibers, including four FAB-250s, and types (incendiary, thermite, etc.). Several RS shells could be suspended under the wing consoles. The crew consisted of four people (two pilots, a radio navigator and a gunner). In this version, it could carry up to 20 people and additional cargo. The military version of the aircraft was produced until the end of the war and was widely used to fly over the front line, to partisans, etc. The flight performance decreased slightly due to the turret and external suspensions - the maximum speed was almost 25 km/h less than that of transport Li-2.

The aircraft proved itself well as a passenger and transport aircraft, was widely used, differed in

reliability, economy and ease of use. It was used in the Great Patriotic War for a wide variety of transportation at the front and in the rear.

Characteristics of Li-2: crew - 4 people, power plant - 2 x ASh-62IR with a capacity of 1000 hp each. s., wing span - 28.81 m and its area - 97.1 m", length - 19.65 m, height - 5.17 m, empty weight - 7650 kg, takeoff weight - 10 700 kg, maximum speed - 320 km/h, range - 2500 km, service ceiling - 5600 m, payload - 14-21 passengers.

At 15 Ma!

German seaplane Oo 15 Ma! (Kit) by Dornier was built around the prohibitions under the Versailles Treaty in Italy since 1922. Val was produced in a large series (more than 300 copies) and flew in many countries. Was in service in Germany, Holland, Spain.

In 1926, the Soviet Union purchased the first 20 machines, and later about 40 more. At first Oo 15 came from Italy with Lorraine-Dietrich engines, later only gliders came from Germany and Sweden, and at plant No. 45 in Sevastopol they were equipped with domestic M-17 engines. Here they were equipped for operation in polar aviation or converted into a military version. Civil aircraft delivered cargo along the entire coast of the Arctic Ocean, where their ability to land on snow, ice and frozen ground was especially useful. In the aviation of the Navy, seaplanes Ro 15 flew until 1941, in polar aviation - until 1946.

Characteristics of Oo 15 Ma!: crew - 4 people, power plant - | x "Lorraine-Dietrich" (M-17) with a capacity of 730 liters. s., wing span - 23.2 m, its area - 96.59 m?, length - 18.15 m, height - 5.35 m, empty weight - 4340 kg, takeoff weight - 7000 kg, maximum speed - 210 km / h, range - 2000 km, practical ceiling - 3600 m, armament - 2 machine guns and 200 kg of bombs.

Oo 24

The Oo 24 aircraft was designed to replace the Oo 15. In 1935, an order for 12 machines was received from the Dutch government, then such machines were purchased by Spain and Sweden.

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At least one aircraft, captured at the end of the war on the Black Sea, flew in the USSR, it was used on the Northern Hydroavilines until 1948.

Characteristics 24 each: crew - 4 people, power plant - 3 x Wright-Cyclone K-1820-E52 with a capacity of 760 hp each. s., wing span - 27.0 m and its area - 108.0 m?, length - 21.9 m, height - 5.7 m, empty weight - 9200 kg, takeoff weight - 12 400 kg, maximum speed - 300 km/h, range - 4500 km, practical ceiling - 4800 m, armament - 2 machine guns and 200 kg of bombs.

NR.52 Natrdep

By the beginning of the Second World War, the British Air Force had 226 NR.52 Natrdep bombers of the Handley Page company, which were put into service in 1937. Like our SB and Il-4 bombers, these aircraft made up the bulk of the British bomber aviation at the beginning of the war . In total, the Hampdens of the British Air Force made 16,541 sorties, in which they dropped 9261 tons of bombs. 413 aircraft were lost in battles, 194 were killed for other reasons. Gradually, the Hamp Dens began to be transferred to training units and units of the British Air Force Coastal Command.

20 copies of HP.52 were delivered to the Soviet Union under Lend-Lease. They were in service with the bomber aviation of the Northern Fleet and took part in combat operations. For example, on July 4, 1943, a group of bombers from the 9th Mine-Torpedo Aviation Regiment flew to the Varanger Fjord area to attack German ships anchored. This group included two Hampdens. However, when leaving the bombing attack, our aircraft were attacked by German BE109 fighters from the 7/Ja5 squadron. As a result of the air battle, both Hampdens were badly damaged and, upon returning to the base, made an emergency landing on the water. The aircraft crews were picked up by torpedo boats.

Characteristics of HP.52 Natrdep MKI: crew — 4 people, power plant — 2 x Vgÿsÿyuÿ Reraviv ÿÿÿ with a capacity of 965 hp each. s., wing span - 21.08 m, length - 16.32 m, height - 4.55 m, empty weight - 5343 kg, takeoff weight - 8508 kg,

maximum speed - 409 km / h, range - 3034 km, practical ceiling - 6919 m, armament - 4 machine guns and 1814 kg of bombs.

Noghisape

The first flight of a prototype fighter Nigpsape ("Hurricane"), developed by the British company "Hawker", took place on November 6, 1935, on June 3, 1936, the company received an initial order for 600 serial aircraft. At the beginning of the Second World War, 19 squadrons of the RAF were fully equipped with Nshtisape aircraft. Since September 1941, Nigpsape fighters began to be delivered to the USSR under Lend-Lease, for the first time they took part in the defense of Murmansk. Later, Soviet pilots fought on the Hurricanes in the Northern Fleet, in particular Hero of the Soviet Union Boris Feoktistovich Safonov (25 personal victories and 14 victories in the group on the I-16, MiG-3 and Hurricanes, died in 1942) carried patrol service and protection of sea convoys in the area of the Kola Peninsula - Murmansk.

The mass appearance of Hurricanes on the Soviet-German front took place in the spring and summer of 1942. They were used by naval aviation in the Northern and Baltic fleets, air force regiments operating on the Karelian, Kalinin, Northwestern, Voronezh fronts and air defense units in various areas countries. From the Hurricanes, 29 air regiments were formed, which accounted for 5.2% of all fighter regiments formed during the war.

In general, the Hurricanes had many shortcomings that determined their heavy losses. In 1942, among the fighters lost by our Air Force, there were about 8% of the Hurricanes, which exceeded their share in the total fleet. With this in mind, in March 1942, the Soviet command decided to carry out a complete modernization of the weapons of the Hurricanes. New powerful weapons

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expanded the capabilities of the Hurricane both in air combat and in operations against ground targets. Therefore, the Hurricane was quite often used as a fighter-bomber and partly as an attack aircraft. At the beginning of 1943, "anti-tank" modifications of the "Hurricane" (Pr and GU) with 40-mm guns in hanging containers arrived in our country through Iran, in the spring of 1943 they were used in battles in the North Caucasus.

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A serious test for the Hurricanes, with which the 235th Air Division was equipped, was participation in the battles on the Don, and then on the distant approaches to Stalingrad. The lack of replenishment led to the fact that British fighters gradually disappeared from the Air Force fleet. If on | July 1942, the Air Force had 202 Hurricanes, then in November there were only 130 left. They continued to play a prominent role only in the northern sectors of the Soviet-German front. With the receipt of a significant number of aircraft of modern types from the domestic aviation industry, the Hurricanes gradually ceased to be used at the front as fighters. A small number of them were used as scouts and spotters.

At the Saratov Higher Aviation Gliding School, the Hurricanes were converted for towing A-7 and G-11 landing gliders. They made several flights with gliders to the partisans. But the main area of application of the Hurricanes in the second half of the war was air defense units. Hurricanes began to arrive there almost from December 1941, but at the end of 1942 this process accelerated sharply. This was facilitated by the arrival from England of PS modification aircraft with four 20-mm Hispano cannons. If on July 1, 1943 there were 495 Hurricanes in the air defense, then on | June 1944 - already 711. They served there throughout the war, they had 252 enemy aircraft on their combat account.

In 1944, part of the aircraft of this type was used in air defense as illuminators to repel night raids. Typically, the Hurricane took two SAB-100 lighting bombs and dropped them, being 2000-2500 m above the enemy bombers. The strike group attacked the illuminated bombers. In different air defense regiments, two to four Hurricanes were kept for this purpose.

The total number of aircraft delivered to the Soviet Union amounted to 2952 copies (in modifications MK.P, ÿU, U, X). In addition to the USSR, the Hurricane fighter was supplied to Yugoslavia, Belgium, Iran, Poland, Romania and Turkey.

Characteristics of Nigpsape MK.P: crew - | man, power plant — | x Ko-Kouse Megÿÿp XX with a capacity of 1280 liters. s., wing span - 12.19 m and its area - 23.93 m ”, length - 9.81 m, height - 3.98 m, empty weight - 2569 kg, take-off weight - 3649 kg, maximum speed - 529 km / h, range - 1480 km, rate of climb - 838 m / min, practical

12 M. and V. Kozyrev 353

tic ceiling - 9800 m, armament - 4 Nisrapo cannons of 20 mm caliber or 4 UB-20 machine guns of 12.7 mm caliber, 8 RS-82 or 450 kg of bombs.

JO 52

The first prototype of a cargo-passenger aircraft ÿu 52/3t of the German company Junkers, equipped with three Pratt-Whitney engines, took off in April 1931, and a year later aircraft deliveries to airlines began. In 1935, Ji 52/3t-23e bombers with VMU 132A-3 engines began to roll off the assembly lines, and by the end of the year they were armed with 12 barding groups. In the summer of 1936, 20 ÿi 52 / 3t-23e vehicles were transferred to Spain, where they were engaged in the delivery of infantry units and artillery from Morocco for the support of the Francoists. From mid-August, some of the machines began to be used as bombers. In November they were joined by ÿi 52/3 p1-24e aircraft from the 88th bomber group of the Condor Legion.

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By the beginning of World War II, the Luftwaffe had 552 J and 52/3t aircraft. In addition to transport and training tasks, ÿi 52 / 3t were also used as minesweepers under the designation ÿi 52 / 3t (M5). At the end of June 1941, four air transport groups were operating on the Soviet-German front, but by the end of the year five more specially formed groups were added to them. A total of 3225 aircraft J and 52/3t of various modifications (cargo, mail, ambulance and other versions with wheeled, ski or float landing gear) were produced.

After the Battle of Stalingrad, more than 50 ÿi 52 / 3t aircraft turned out to be trophies in the USSR. Land options were transferred mainly to the Civil Air Fleet. The float variant appeared after the war; perhaps it was the only instance. In 1946-1948. he flew on the river airlines of Eastern Siberia.

Characteristics of ÿi 52/3t: power plant - 3 VM 132 engines with a capacity of 960 hp each. s., wing span - 29.2 m and its area - 110.0 m ”, aircraft length - 18.9 m, height - 5.55 m, empty weight - 5725 kg, maximum take-off weight - 11,000 kg, maximum speed - 275 km / h, practical ceiling - 5900 m, range - 1300 km.

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Mapt 156 (PS-30)

The transoceanic flying boat Mashp 156 with a long flight range was built in the USA by the firm Ciepp 1. Magip Sogr. by Soviet order. It was supposed to be used as a long-range naval reconnaissance and bomber with the construction of a large series. In February 1938, the first built machine (out of three ordered) was delivered disassembled to the USSR. The assembled prototype was transferred to the Research Institute of the Civil Air Fleet and tested in Khimki until 1939
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For licensed production, it was planned to build a specialized plant No. 30 in Savelov, supervised the refinement and prepared a military version of P.D. Samsonov. He designed a car with a bomb bay in the bottom and machine gun armament, in 1938 even a full-size model was built. However, the aircraft was not put into series production: it became clear that the giant seaplane, relatively slow-moving, should give way to a land bomber and torpedo bomber with speeds at least one and a half times greater. The hydroplane, which received the name PS-30, was transferred to Aeroflot, where it was operated until 1944 on the Khabarovsk-Petropavlovsk-on-Kamchatka airline. Then it was mothballed and written off in 1946, the fate of the other two cars is unknown.

Characteristics of the M-156S: crew - 7 people, power plant - 4 x Wright-Cyclone SK-1820-C2 with a capacity of 850 hp each. s., wing span - 47.9 m and its area - 213.0 m ”, length - 28.0 m, height - 7.51 m, empty weight - 14,400 kg, take-off weight - 28,100 kg, maximum speed - 252 km / h, range - 5000 km, practical ceiling - 4400 m.

0520 kÿpÿÿ5ÿÿÿ

The first flight of the ship's reconnaissance spotter 0520 Kÿprÿvÿeg ("Kingfisher") of the American company "Vout" took place | March 1938. The aircraft actively participated in the US Navy in World War II.

In the spring of 1944, on account of the share in the division of captured Italian ships, the Americans temporarily provided the USSR with the light cruiser Milwaukee. August 24, 1944 "Milwaukee", renamed "Murmansk", arrived at the Northern Fleet. There were two O521)-3 on board the cruiser. in combat operations

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reconnaissance aircraft apparently did not participate, since the Murmansk was mainly anchored in Arkhangelsk, but made training and various support flights. The Milwaukee cruiser, along with the aircraft, was returned to the Americans in 1947.

Characteristics 0520: crew — 2 people, power plant — | x E-1830-82 with a capacity of 450 liters. s., wing span - 10.95 m and its area - 24.34 m", length - 10.31 m, height - 4.61 m, empty weight - 1870 kg, takeoff weight - 2722 kg, maximum speed - 292 km/h, range - 1296 km, practical ceiling - 3960 m, armament - 2 Vgompÿpe machine guns of 7.62 mm caliber and ÿ bomb weighing 295 kg.

Oh-52 Ohm!

Army reconnaissance and surveillance aircraft O-52 Ohm! ("Owl") was created by the American firm "Curtiss" in 1940. The US Air Force ordered a series of 203 O-52 aircraft even before the first flight of a prototype that took to the skies in 1941.

However, the practice of military operations in Europe has shown that the very idea of a classic short-range reconnaissance is already outdated. He was unable to act in conditions of powerful air defense, a large concentration of enemy fighters in the air. Slow-moving and lightly armed "universal" biplanes and monoplanes began to be replaced by high-speed machines, usually converted from fighters. 19 O-52s were delivered to the Soviet Union.

Characteristics of the O-52: crew - 2 people, power plant - 1 x Rtai & Mipeu K-1340-51 with a capacity of 600 hp. s., wing span - 13.36 m and its area - 19.51 m?, length - 7.75 m, height - 2.83 m, empty weight - 1919 kg, takeoff weight - 2407 kg, maximum speed - 335 km / h, range - 1126 km, armament - 1 machine gun of 12.7 mm caliber.

R-39 AigasoBga

The first flight of a prototype fighter P-39 by an American company. The Bell took place in April 1939. In April 1940, the British government ordered 675 aircraft of the R-39 export version for the British Air Force. Veli

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The first P-39s, called the Airacobra, began to arrive in Britain in July 1941. However, they were not successful in air battles against high-speed Messerschmitt BE 110 fighter-bombers over the territory of Great Britain. Therefore, already in December 1941, the Air Cobras were decommissioned by the British Air Force, some of the aircraft were sent to the Middle East and Southeast Asia, and the other part was offered to the Soviet Union.

By the end of World War II, the R-39 Aerocobra fighter in the R-39M and R-390 versions became the main fighter among the fighters supplied by the Allies to the USSR under Lend-Lease. In the process of mass production, which lasted until July 1944, Bell built 9558 fighters, of which 4924 were delivered to the Soviet Union.

Of the Lend-Lease fighters, the Airacobra was the most successfully used aircraft, of which in 1942-1943. 25 air regiments were formed and sent to the front, which accounted for 4.2% of all fighter air regiments formed during the war years. Unfortunately, the Aerocobra had shortcomings and defects. During its flight tests at the Air Force Research Institute, accidents occurred, as a result of which three test pilots died. In addition, during operation in combat units in 1943, there was a high percentage of defective Airacobra aircraft - up to 17.5%.

From the spring of 1943 until the end of the war, our ace Alexander Ivanovich Pokryshkin flew the Aerocobra, scoring 48 of his 59 victories on it. Together with A.I. Pokryshkin on these fighters ended the war and such famous aces as Nikolai Dmitrievich Gulaev (57 victories), Grigory Andreevich Rechkalov (61 victories), Dmitry Borisovich Glinka (50 victories), etc.

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Characteristics of R-390: crew — 1 person; x U-1710-35 with a capacity of 1150 liters. s., wing span - 10.36 m and its area - 19.86 m?, length - 9.2 M, height - 3.78 m, empty weight - 2561 kg, take-off weight - 3447 kg, maximum speed - 605 km/h, range - 845 km, rate of climb - 762 m/min, service ceiling - 10,670 m, armament - 1 T9 cannon of 37 mm caliber, 4 E machine guns of 12.7 caliber mm and I bomb weighing 227 kg.

R-40 UUaghau/K

The plane of the American company "Curtiss" P-40 Magÿamk ("Hawk of War") was considered one of the main fighters of the US Air Force in World War II. Before production was completed in December 1944, a total of 15,000 P-40s of various modifications were built. In the British Air Force, the P-40 aircraft received from the USA were called Kiyuhamk MK.ÿU. |

The first P-40s arrived in Arkhangelsk in October 1941. These were British vehicles, which the British hurried to get rid of at the first opportunity. The resulting aircraft were assembled at an airfield located 25 km from Arkhangelsk. Soon, 25 more R-40s, purchased in the USA for gold, arrived. In the shortest possible time, the aircraft began to be transferred to combat units. Soviet pilots considered the R-40 to be medium aircraft, better than the I-15 and I-16, but worse than the Yakov. This opinion persisted until the end of the war. The R-40 was inferior in popularity to the Yaks and La.

At the beginning of 1942, modifications of the R-40E, R-40ÿ, R-40K, R-40M and R-40M began to arrive from the USA. In total, 2430 P-40 aircraft were sent to the Soviet Union, but only 2097 aircraft were delivered.

Characteristics of the R-40: crew - 1 person, power plant - | x AShzop U-1710--39 with a capacity of 1150 liters. s., wing span - 11.38 m and its area - 21.92 m ”, length - 9.5 m, height - 3.22 m, empty weight - 2880 kg, take-off weight - 4173 kg, maximum speed - 539 km / h, range - 1368 km, practical ceiling - 8840 m, armament - 6 Vgompÿpe machine guns of 12.7 mm caliber and 320 kg of bombs.

ÿ-47 Tÿopdegoÿ

In 1944, the Soviet Union received from the United States 191 R-47 Tÿipdegbo (“Lightning Strike”) fighters from the Ripablik company, another 5 aircraft received in 1945. Most of the P-47 arrived in the Soviet Union via the southern route through Iran to the Middle Asia (Kirovabad), where the aircraft were received by the 11th Reserve Bomber Aviation Regiment. The first R-470 fighters began to arrive on August 24, 1944.

The 11th ZBAP included four squadrons: bomber crews were trained on the basis of the 1st and 2nd,

base 3rd and 4th - training of fighter pilots, mainly for the R-39M / O and R-47 aircraft.

Until the end of the war in Europe, the R-47 fighters did not appear in service with the front-line units of the Red Army Air Force, almost all of them entered the fighter aviation regiments of the Southwestern Air Defense District. This powerful aviation grouping was formed on December 24, 1944 to cover the communication routes of the 1st, 2nd, and 4th Ukrainian Fronts in the RUMBNI, Hungary, and Czechoslovakia.

Characteristics of R-47: crew — 1 person, power plant — | x Prgai & Mÿipeu K-2800-21 with a capacity of 2000 liters. s., wing span - 12.43 m, length - 11.01 m, height - 4.31 m, empty weight - 4491 kg, takeoff weight - 6123 kg, maximum speed - 697 km/h, range - 1030 km, practical ceiling - 12,802 m, armament - 8 machine guns of 12.7 mm caliber and 227 kg of bombs.

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R-51 Miztapad

The North American R-51 Mi$ap fighter was adopted by the US Air Force in 1940, and in the same year 620 copies were ordered by the British Air Force. In September 1941, Lend-Lease deliveries of P-51s from the USA to England began.

The Mustang performed well as a tactical reconnaissance and strike aircraft. At low altitudes, it turned out to be faster than the German BE-109 and Yem 190 fighters. 10 copies of the R-51 were delivered to the Soviet Union.

Characteristics of the R-51 Mi (April MK.I: crew - | man, power plant - | x ASzop M-1710-EZK with a capacity of 1150 hp, wingspan - 11.29 m and its area - 21, 83 m", length - 9.81 m, height - 3.72 m, empty weight - 2858 kg, takeoff weight - 3900 kg, maximum speed - 628 km / h, range - 1680 km, rate of climb - 564 m / min , practical ceiling - 9754 m, armament - 4 machine guns of 12.7 mm caliber and 4 machine guns of 7.62 mm caliber.

R-63 KlasoBga

Deliveries of Bell R-63 Kaprsobga fighters for the US Air Force began in 1943. In December of the same year, Bell sent detailed information about the R-63 to potential customers, including Soviet representatives. In 1944

Lend-lease delivery of R-63 fighters to the Soviet Union began, with which air defense combat units were equipped, since at altitudes of more than 7500 m, the King Cobra overtook both the Spitfire and our La-7. The very first unit to receive the Kingcobras was the 28th Air Defense Regiment, based near Moscow at the Vnukovo airfield, this happened in December 1944. First of all, the Kingcobras were replenished with units previously armed with R-39 , on May 1, 1945, there were already 51 copies of the R-6ZA in the air defense regiments. In the Air Force, the introduction of new fighters began in the summer of 1945. Priority was given to the Far Eastern air armies, which were preparing for combat operations against Japan.

The first division to receive the R-63A was the 190th Fighter Air Division, which relocated to Transbaikalia in June 1945. From June 24, it began to receive Kingcobras and by August 2 had completed retraining on them. During combat operations in Manchuria, the division operated from two airfields near the town of Choibalsan in Mongolia. In the same place, in the 12th Air Army on the Trans-Baikal Front, the 245th IAD fought, which included two regiments (940th and 781st) with R-63 fighters. In July-August, the first Kingcobras arrived in the 888th and 410th air regiments based in Kamchatka.

During the war with Japan, Kingcobras were used to escort bombers and reconnaissance aircraft, provide air cover for troops and ships, attack and bombard Japanese positions. Japanese aviation practically did not provide serious opposition to the advancing Soviet army, so it was not possible to test the qualities of the Kingcobra in air battles with Japanese aircraft.

The surrender of fighters from the Soviet mission in Fairbanks (USA) ceased immediately after the surrender of Japan. We managed to get 2,400 Kingcobrs out of 2,450 ordered by the Soviet side under Lend-Lease.

Characteristics of the R-63A: crew - | man, power plant — 1 x AShzop U-1710-93 with a capacity of 1500 hp. s., wing span - 11.68 m and its area - 23.04 m?, length - 9.96 m, height - 3.84 m, empty weight - 2892 kg, takeoff weight - 4763 kg, maximum speed - 660 km/h, range — 3540 km, rate of climb — 1044 m/min, service ceiling — 13,106 m, armament — 1 37 mm cannon, | machine gun Vgouptr caliber 12.7 mm and 3 bombs weighing 227 kg each.

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RVY Sagaipa (GTS)/RVM-1 Motaa

In March 1935, the prototype of the RVY patrol seaplane of the American company Consolidate made its first flight. Since 1936, two modifications of the RVY-1 and RVU-2 aircraft have been mass-produced. The Soviet Union became interested in this aircraft, which led to an order for three aircraft and negotiations on their licensed production in the USSR. Technical documentation and working drawings for the production of the aircraft, which received the domestic designation GST (transport seaplane), were prepared by OKB G.M. Beriev.

The first boat with American engines was assembled at the Consolidate firm by the summer of 1938, and on June 3 factory tests of the GTS aircraft began. In total, two cars were built with American engines and 27 cars with various types of domestic engines (M-87, M-88, M-62). The civil version of the GTS received the designation MP-7, it was equipped with M-62 engines and was designed to carry 20–24 passengers, mainly on Siberian and Far Eastern airlines. The GTS were in service with the naval aviation and were used during the war. In addition, during the war, under lend-lease, the United States delivered 48 RVU-6A variant aircraft; they were used by the aviation of the Northern and Pacific fleets to protect sea areas. After the war, some of the machines were transferred to the polar aviation; they flew in the North and Siberia until the mid-1950s.

From February 1943, the Consolidate company began to produce a modification of the RVY-5A aircraft under the designation RVM-I Kotad (“Nomad”). The RVM-I had an increased fuel capacity and airframe weight, and the tail section of the fuselage was lengthened. It was these machines that the Americans eventually offered the USSR, as a result, almost all flying boats of this modification (118 out of 138) ended up in our country. By June 16, 1944, 24 boats arrived in the Soviet Union, the second batch of RVM-1 was sent to the Pacific Fleet. On October 28, the first RVM-1 arrived in Sevastopol, and four Nomads for polar aviation were also ferried along the same route.

In the Northern Fleet, the 118th reconnaissance regiment received American boats (by September 1, 1944, it had 8 RVM-1[], in the Air Force of the White Sea Flotilla, the 44th, 53rd and 54th th department

noah naval reconnaissance squadron. The aircraft carried out anti-submarine patrols and ice reconnaissance. Part of the RVM-I received from the USA had radars, which significantly increased the search efficiency. They were armed with PLAB-100 bombs dropped by parachute.

On January 1, 1945, the Northern Fleet had seven RVM-1 flying boats in the 118th regiment. Another 18 American boats were in the 44th, 53rd, 54th regiments and the 20th squadron of the Air Force of the White Sea Flotilla. In total, the crews of the RVM-1 of the Northern Fleet and the White Sea Flotilla made 340 sorties during the war, sinking several enemy submarines.

In the Baltic, the first RVM-1 aircraft appeared in August 1944, by March 1945 there were 11 RVM-1 aircraft in the 15th, 16th and 17th anti-submarine defense squadrons. In the Black Sea Fleet, the Nomad was the first to master the Nomads since June 1944, the 18th squadron. Later, RVM-1 received the 11th and 82nd squadrons, but the war on the Black Sea was already ending. From the end of August 1944, "Nomads" were engaged in the delivery and landing of troops in Romania and Bulgaria. In total, by May 9, 1945, three Western fleets received a total of 107 copies of the RVM-1.

Characteristics of RVY-5: crew - 7-9 people, power plant - 2 x Rga! & Uÿipeu K-1830-82 with a capacity of 1200 hp each. s., wing span - 31.7 m, its area - 130.0 mg, length - 19.45 m, height - 5.76 m, empty weight - 7893 kg, takeoff weight - 15 145 kg, maximum speed - 322 km/h, range - 3049 km, practical ceiling - 6584 m, armament - 2 machine guns of 12.7 mm caliber, 6 machine guns of 7.62 mm caliber and 454 kg of bombs or 2 torpedoes.

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beu-2RA

The two-seat fighter Zeu-2RA was designed and built in 1936 in the USA by the Russian emigrant, aircraft designer and pilot A.N. Prokofiev-Seversky, who founded his own firm, Seversky Aircraft Corporation, in the United States. The fighter was intended to escort and protect bombers from enemy fighters; it could also be used as a long-range reconnaissance aircraft.

In addition to the usual landing gear, the aircraft could be mounted on floats with retractable wheels, thus acquiring the properties of an amphibian. The design features are

th take-off and landing device allowed the aircraft to be operated from water, ice or snow.

According to an agreement signed on March 26, 1937, the Seversky Aircraft Corporation manufactured two aircraft for the USSR (2RA-G, with a conventional wheeled chassis and 2RA-A with a wheeled float) and issued a license for their production. The first plane arrived in the USSR on a ship in November 1937, and the Seu-2RA-A amphibian arrived only in the spring of 1938, it was delivered to the 8th department (OELID) of TsAGI.

The aircraft with a 2RA-G wheeled chassis made 16 flights at the Air Force Research Institute using skis until March 21, 1938, after which it was sent for repair due to a piston burnout in one of the engine cylinders. After the repair, the aircraft was put on wheels and tested until July 10. Despite excellent flight qualities, the 2RA was not recommended by the military for mass production. During the tests, insufficient rigidity of the machine gun installation was revealed, which caused a large dispersion during firing. In addition, the engine worked unreliably - it was repaired twice. In the conclusion of the Research Institute of the Air Force, it was noted: “The Seversky 2RA-G aircraft is for armament in the Air Force. The Red Army cannot be accepted due to the great vulnerability of its tank wings and the general lack of knowledge of its small arms and propeller group.

The second 2RA-A aircraft, made in the amphibian version, was tested in the USSR by pilots of naval aviation. According to their conclusions, the aircraft was of no interest to the Navy Aviation. In the USA, the 2RA aircraft was not mass-produced.

Characteristics of 2RA: crew - 2 people, power plant - | x "Wright-Cyclone" SK-1820-S2 with a capacity of 850 liters. s., wing span - 10.97 m and its area - 20.44 m?, length - 7.72 m, height - 2.89 m, empty weight - 1900 kg, takeoff weight - 3645 kg, cruising speed - 389 km/h, range - 1930 km, practical ceiling - 7620 m, armament - 2 machine guns of 12.7 mm caliber and 2 machine guns of 7.62 mm caliber or 3 machine guns of 7.62 mm caliber and 227 kg of bombs.

5.M.62/MBR-4

A prototype seaplane 5.M.62 of the Italian company Savoia Marchetti first took off in 1926, the aircraft was intended to be used as a bomber

or scout. In 1928, a small number of civil flying boats 5.M.62R were produced, some of them with a closed cabin for the crew and four passengers, others with open cabins. Part of the aircraft was delivered to the Italian airline ZAM, and part was exported to the USA and Spain. In 1930, modification 5.M.6265 appeared, which had an increased span wing, a modified fuselage design, a more powerful engine, an increased capacity of fuel tanks and a larger bomb load.

The Soviet Union placed an order in Italy for the manufacture of 50 machines 5.M.6265, in March 1930 the first machine was delivered to Sevastopol. In total, the USSR received 24 vehicles built

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company $/AI, and produced under license another 29 aircraft under the designation MBR-4 (marine reconnaissance bomber). Many MBR-4s were equipped with skis for taking off and landing on snow.

Characteristics of the MBR-4: crew - 4 people, power plant - | x Avo 750 with a capacity of 850 liters. s., wingspan - 16.66 m, empty weight - 2630 kg, take-off weight - 5030 kg, maximum speed - 220 km/h, practical ceiling - 4900 m, armament - 4 machine guns of 7.7 mm and 600 caliber kg bombs.

ÿrÿNÿge

The fighter Zzrshe ("Spitfire Man") of the English company "Supermarina", which was part of the company "Vickers-Armstrong Ltd.", in 1936 was adopted by the British Air Force. During the war, Briige was continuously modified and improved, during the entire period of mass production, the company produced 22,759 copies in various versions. Lend-lease deliveries of Spitfire fighters to the Soviet Union began in 1943, in the summer of that year they took part in battles in the Kuban and Don, and by the end of the war they were transferred to air defense units. In total, 1338 Spitfires were delivered under Lend-Lease.

Characteristics of brig MK.I: crew - 1 person, power plant - 1 x Meshp 50M with a capacity of 1470 hp. s., wing span - 11.23 m and its area - 22.5 m?, length - 9.12 m, height - 2.69 m, empty weight - 2261 kg, takeoff weight - 2812 kg, maximum speed - 582 km / h, range - 683 km, speed

climbing capacity - 771 m / min, service ceiling - 9723 m, armament - 2 Nisrapo cannons of 20 mm caliber and 4 Vgomshpr machine guns of 7.7 mm caliber.

Monee U-11 (BSh-1)

In the spring of 1936, the U-POV aircraft developed by the American company Uipee Apsguy Shs was purchased under license. with the aim of studying it and introducing it into mass production as a two-seat reconnaissance aircraft and a light bomber. In 1937-1938 work on the organization of mass production was carried out in the Design Bureau S.A. Kocherigin, a total of 36 vehicles were built by the end of 1938, which received the designation BSh-1 (short-range attack aircraft).

However, flight tests of the aircraft showed that it is inferior in its characteristics to the domestic R-9 and R-10 aircraft. In this regard, the mass production of BSh-1 was stopped, and all the built aircraft were transferred to civil aviation in 1939, replacing the engine on the aircraft with the domestic M-62IR. These machines, designated PS-43, were used as mail planes on the Moscow-Kyiv and Moscow-Tashkent airlines.

Characteristics of BSh-1 (Ushee U-POV): crew - 2 people, power plant - 1 x K-182062 with a capacity of 800 hp. s., wing span - 15.3 m and its area 33.67 m?, aircraft length - 11.3 m, height - 3.1 m, empty weight - 2405 kg, takeoff weight - 3856 kg , maximum speed - 226 km/h, range - 1609 km, practical ceiling - 6096 m, armament - 6 Vgompipe machine guns and 300 kg of bombs.

16. Airships and Balloons

Airships

Soviet aviation during the Great Patriotic War had several soft and semi-rigid airships. Huge in volume, they were good targets and therefore did not participate in hostilities, but were successfully used to train paratroopers, transport cargo, and detect mines and sunken ships in the waters of the seas. They were used for patrolling the northern regions, for ice reconnaissance along sea routes, for detecting fires in forest areas, for supplying polar stations, etc. In addition, they

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engaged in the transfer of military units to remote garrisons, carried out anti-mine and anti-submarine service on the northern coast, escorted sea convoys, etc.
d.

From the very beginning of the war, the airships USSR V-1, USSR V-12 and Malysh took part in supporting the combat operations of the Red Army, by the end of the war they were joined by Patriot and Pobeda. In 1943-1944. 969 sorties with a total duration of 1284 hours were made on the USSR V-12 airship. The airships worked almost flawlessly and were very tenacious. One of them, "USSR V-12", on the Kalinin front came under fire, received about a hundred holes, but flew to his detachment, and then returned to the base near Moscow.

In total, during the years of the Second World War, Soviet airships performed more than 1,470 flights, covering a total distance of 6 million km, they transported 194,580 m? hydrogen and 319,190 kg of various cargoes.

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observation balloons

From the very beginning of the war, in addition to spotter aircraft, observation balloons were also used. Shooting batteries of the enemy from them could be observed at a distance of up to 20 km, and columns and trains - up to 25 km. Along with these crews of observation balloons, the tasks of photographing the terrain, checking the camouflage of our troops, etc., were set. During the war, nine aeronautic divisions of 3-4 detachments each operated in our army. |

The artillery observation balloon consisted of a shell (two-layer rubberized fabric with an aluminized coating) filled with hydrogen, rigging, and a gondola woven from wicker for two observers. The balloon was raised and lowered on a cable with the help of a winch mounted on a car; combat work was carried out mainly at night. More than once balloonists burned in the air, when the contents of the shell (hydrogen) flared up like a torch and had to be ejected with a parachute. But balloonists were threatened not only from the air - they were subjected to raids by sabotage groups and shelling. Fighting balloons, the enemy used blasting grenades. Exploding, they often interrupted the cable, and the balloon, together with the observers, went into free flight.

At the beginning of 1945, balloonists, observing the ports of Klaipeda and Liepaja, did not allow the Germans to take the stolen valuables out of Lithuania and Latvia. And on March 22, 1945, the Krasnaya Zvezda newspaper wrote: “In the battles to destroy the East Prussian grouping southwest of Koenigsberg, aerial observation balloons provide great assistance to ground units.”

In total, during the Great Patriotic War, units of observation balloons made about 20,000 ascents, while 4617 artillery batteries, 155 tank columns, 506 concentrations of infantry were reconnoitered from the enemy. As a result of corrections from observation balloons, 1,716 artillery batteries were destroyed and suppressed, 103 concentrations of infantry and tanks were dispersed and partially destroyed. The enemy burned 110 of our observation balloons in the air.

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barrage balloons

Barrage balloons were widely used in the air defense system during the war years. In contrast to the observation balloons, they were of smaller volume, did not have a gondola and could rise to a greater height - up to 4000-4500 m. Outwardly, barrage balloons resembled small airships, they usually rose at night one by one or two on one cable (tandem) in a checkerboard pattern. Their operating principle was as follows.

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In the event of a collision of an aircraft with a cable, an inertial mechanism fixed under the balloon was triggered by the impact. The balloon was disconnected, and at the end of the cable a drag parachute was opened, pushing the cable into the wing. It was crushed, and even collapsed, the plane overturned. A mine fixed on an inertial mechanism was pulled up to the aircraft and exploded. The first German aircraft was “caught” over Moscow in August 1941. In total, more than 120 collisions of aircraft with cables were recorded, 35 aircraft were destroyed in the air.

Fearing a meeting with balloons, the crews of the enemy aircraft were forced to either abandon the raid or climb to a high altitude, which sharply reduced the accuracy of whole-body bombing. The air defense division with attached barrage balloons covered an area of 75 km². By the beginning of the war, the army had 6 regiments and 10 divisions of barrage balloons. The total number of these balloons during the war years reached 3 thousand. In total, during the war years, air defense units carried out about 300 thousand balloon lifts.

The tactics of using barrage balloons were continuously improved. In April 1942, during a sudden assault raid by the Germans on the ships of the Baltic Fleet wintering on the Neva, the commander of the air defense corps, Major General G. Zashikhin, ordered the balloons to be raised in the midst of an air battle. The German bombers, being trapped, began to hastily get rid of the cargo, losing 25 aircraft in the process. The ships were almost unharmed.

Barrage balloons were sometimes used as repeaters to provide radio communications. For example, D. Shostakovich's Seventh Symphony was broadcast from besieged Leningrad using a cable-antenna raised by a barrage balloon. Later the radio

The station with such an antenna provided backup communication between the front command and the Headquarters. The main communication was carried out by a submarine cable.

Training balloons

Another area of application of balloons during the war is the training of paratroopers. A balloon, unlike an airplane, does not need an airfield; it can lift paratroopers in the immediate vicinity of the unit, anywhere. Several balloons can work simultaneously, which increases the effectiveness of training.

In April 1942, the 1st separate airborne division of the Airborne Forces was formed. The intensity of release from one balloon reached 2278 people per day. In total, during the war years, according to the Central Archive of the Ministry of Defense, 549,152 jumps were made from a balloon, each of which was ten times cheaper than from an airplane. At the same time, a large number of transport aircraft were released to perform combat missions.

17. Hovercraft

In December 1934, a special technical bureau was created at the MAI for the development of air-cushion vehicles, headed by Vladimir Izrailevich Levkov, professor of the Department of Applied Aerodynamics. The production of working drawings of the boat L-I began, by the summer of next year the first flying boat was ready. It was a small wooden catamaran with three propeller-motor units. Two M-11 aircraft engines were installed in a horizontal position in the funnel-shaped shafts of the platform connecting the boats, they created an air cushion. The third (propulsion) engine, also M-11, was located in the stern of the boat on a removable four-legged pylon and ensured the horizontal movement of the apparatus.

State tests of the "air glider L-1" (the official name of the device) began on Lake Pleshcheyevo near the city of Pereslavl-Zalessky, Yaroslavl Region, on October 2, 1935, and lasted 10 days. The tests were generally successful, the test report

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approved by M.N. Tukhachevsky. He wrote that it was necessary to raise the question of including in the plan for pilot construction for 1936 two similar "gliders" - a torpedo boat and a "conveyor for landing troops."

In 1937, an all-metal, duralumin apparatus L-5 was created. It was of the catamaran type, hull length 24 m, width 5.35 m.

shaft tower with a turret ring for a machine-gun spark. Under the center section, in the dome space, there were trunnions with locks for hanging a torpedo, the device could take on board 8 depth charges. The maximum take-off weight of the device was 8600 kg, the power plant consisted of two engines with a capacity of 890 hp each. With. In 1937, the L-5 was handed over for trials on the Baltic Sea, near Leningrad. During the tests, the device developed a speed of up to 72.8 knots, that is, 131 km / h. The device maneuvered well both over water and over land. The maximum soaring height was 0.2–0.3 m, which made it easy to overcome swamps, coastal shoals and undersized shrubs.

In December 1938, People's Commissar of the Navy M.P. Frinovsky informed the Chairman of the Defense Committee V.M. Molotov about the test results of the L-5: “The test results showed that the tactical and technical qualities of the new boat significantly exceed the quality of the torpedo boats in service with the RKKF ... In order to introduce boats of this type into service, the Main Military Council of the RKKF considers it necessary - DIMIM during 1939 to build the first, experimental series of 9 boats, putting them into service with each sea in order to train personnel and practice the tactics of new weapons ... ”March 11, 1939. by order of the people's commissar of the shipbuilding industry I.F. Tevosyan Professor V.I. Levkov was appointed head and chief designer of the new TsKB-I, and plant No. 445 (former glider plant) in Tushino near Moscow became the production base for the construction of flying boats. The first production vehicles L-5s, equipped with M-62 engines with a capacity of 1000 hp. s., entered the division of torpedo boats of the Baltic Fleet.

In connection with the deployment of the construction of combat boats, there was a need for training apparatus. This was the new boat L-9 (maximum flight weight 2250 kg, engines - MG-21), created by order of the Navy in 1939. It was intended for training commanders, drivers, mechanics and gunners of ships of the L-5 type, as well as could also be used for communications, guard duty, as a submarine destroyer, and even for landing troops.

In October 1941, all work on hovercraft was stopped, and the Design Bureau V.I. Levkov was evacuated to the Ural city of Alapaevsk, where V.I. Levkov should

The role of the chief engineer of the plant ensured the construction of landing gliders. In 1942-1943. IN AND. Levkov developed a new hovercraft design (project 171) with AM-38 engines placed inside the boat's hull. On January 28, 1944, the project 171 was approved by Admiral L.M. Haller. On the basis of these studies, Navy specialists prepared a tactical specification for a hovercraft torpedo boat. However, by the end of the war, the Navy abandoned hovercraft.

Abroad, the development of hovercraft began only after almost 20 years, in the 50s. So, for example, in the United States, air-cushion vehicles (“flying platforms”) M2-6 from Chrysler, U7-7 from Curtiss-Wright, U4-8R from Pyasetsky, etc., were developed. d.

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In 1939, TsAGI began work on the use of an air-cushion chassis on an aircraft instead of the usual wheeled or ski chassis. The work was carried out under the supervision of Nikolai Ivanovich Efremov and Alexander Davidovich Nadiradze (before that, they had worked at V.I. Levkov Design Bureau on hovercraft). In 1940, they experimented with the UT-2 aircraft, on which, instead of the landing gear, a flexible air cushion guard made of elastic rubberized fabric was installed. The dimensions of the flexible fence ensured a stable position of the aircraft during takeoff and takeoff, while the aircraft engine and an additional fan to create an air cushion were operating simultaneously, the fan was driven by a motorcycle engine with a capacity of 25 hp. With. The aircraft behaved normally, the flight did not differ significantly from the usual one, in flight the flexible fencing was retracted along the perimeter of the air cushion into the fuselage niche, after which the niche was closed with flaps. The NKAP instructed the authors to develop a similar design for the serial Pe-2 aircraft, which was completed in 1941.

In the Pe-2 aircraft, a double air cushion was used, under each engine nacelle, with a mechanical drive to the fan from the corresponding M-105 engine in the form of a long shaft with an angular gear and an elastic clutch

captivity. According to the intention of the authors, after takeoff, the air from the cylinders was released, and the airbags were drawn into the rear compartments of the engine nacelles, where they were closed with flaps. The whole device functioned properly, the plane taxied, but the matter did not have time to REACH before flights. |

At the same time, N.I. Efremov presented a project for a twin-engine bomber with two AM-38 engines, using the jet effect of exhaust gases (which he tested on the I-16 aircraft) and with a take-off device on a “cushion”, already tested on the Pe-2. On June 20, 1941, the NKAP made a decision to design and build an aircraft. But in the conditions of war, this decision was not implemented.

18. CRUISE MISSILES

Pre-war cruise missiles

In the Soviet Union, the development of cruise missiles was carried out in the 1930s, and the work went in two directions - rockets with a powder engine and rockets with a rocket engine. To concentrate efforts in the field of creating rocket technology, on September 21, 1933, by order of M.N. Tukhachevsky on the basis of the Leningrad Gas Dynamics Laboratory (GDL) and the Moscow Group for the Study of Jet Propulsion (GIRD) in Moscow, the Jet Research Institute was formed. It was after the formation of the RNII that work in the Soviet Union in the field of rocket technology, and in particular on cruise missiles (CR), took a military direction.

The decision of the GIRD management to start work on the CR was made after the cessation of work on the RP-1 rocket plane, the overall management of work on the topic of cruise missiles was carried out by S.P. Korolev. The first Soviet KR was a “geometrically similar model” of the RP-1 rocket plane, called KR 06, it was carried out in two modifications - 06/1 and 06/2, their tests were carried out in 1934. Then KR 212 appeared in development , 216, 301 (all with rocket engines), 217/1 and 217/2 (both with a powder engine). In one of his articles published in the journal Aircraft Gekhnika, S.P. Korolev gave. definition of a cruise missile: “A cruise missile is an aircraft propelled by a direct reaction engine and having surfaces that develop lift when flying in the air. The flight may pursue the achievement of the highest climb height followed by gliding and landing or range, i.e. coverage

the greatest distance in a straight line or along a given route”.

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Cruise missiles 212 and 216 belonged to the ground-to-ground class, 301 to the air-to-air class, and 217/1 and 217/2 to the ground-to-air class. The creation of cruise missiles was carried out according to the tactical terms of reference of the Main Directorate of the Air Force and the Communications Directorate of the Red Army. In 1937, the head of the RNII I.T. Kleimenov and his deputy G.E. Langemak were illegally arrested and shot. Soon S.P. Korolyov was also arrested and sentenced to ten years in prison on false charges. However, for some time yet. work on CD projects continued.

The KR 216 was carried out according to the usual aircraft scheme with a high wing and was equipped with an alcohol-oxygen liquid-propellant rocket engine and a GPS-2 stabilization machine. The rudder was a plane oscillating relative to the hinge; two fixed keels were fixed at the ends of the plane. The oxidizer was poured into tubular tanks, which were the spars of the wing, the fuel was poured into a cylindrical tank located in the lower part of the fuselage. The fuel supply to the LRE, located in the rear fuselage, and the pneumatic system of the stabilization machine were powered by compressed air from cylinders. In the bow of the KR, automation and a warhead were installed. The take-off of the rocket was carried out with the help of a rocket cart, on which there was a powder starting engine. In 1936, flight tests of four prototypes of the KR 216 were carried out.

KR 212, which was supposed to carry 30 kg of explosives, was planned for use from both ground launchers and heavy bombers. For the aviation modification of the KR 212, it was supposed to move the wing from the middle to the upper position, and lower the keel under the hull. The first launch of rocket 212 took place on January 29, 1939, instead of the warhead, a centering weight and a parachute were placed. However, the KR 212 remained experimental (only two launches were carried out) and was tested only from a ground launcher due to the unreliable operation of the flight control automation. So, for example, in the first launch, the rocket reached a height of 250 m, after which its parachute opened prematurely, and in the second launch, the rocket went off course after takeoff.

Rocket 217 was designed to destroy moving air targets from the ground. Stabilization and control of the rocket in flight, as well as actuation of the fuses, had to be carried out by telemechanical devices during its flight by a radio beam, and in the final phase of the flight by an optical signal from a target illuminated by a searchlight.

KR 301, launched from aircraft, was a modification of KR212 and was originally intended for the self-defense of bombers; when launched from a height of 2 km, its flight range was to be 10 km. However, the difficulties of aiming a missile at such a highly maneuverable target as a fighter-interceptor forced us to consider the option of using the missile to strike fixed ground targets. In 1938, several test launches of 301 missiles were made from a TB-3 aircraft.

In 1939, funding for the development of cruise missiles at the RNII ceased, the institute itself was soon renamed NII-3 of the People's Commissariat of Ammunition, and the entire team began to create powder unguided rockets and a multiply charged launcher for volley fire. Soon this work led to the birth of the famous Katyusha.

Nevertheless, the experience gained during the creation of the first cruise missiles and their testing came in handy at the end of the war and helped the domestic rocket industry to get back on its feet faster. By the autumn of 1944, S.P. Korolev completed the designs of the D-2, D-3 and D-4 cruise missiles, and the proposals were sent to the People's Commissariat of Aviation Industry.

Main characteristics of cruise missiles

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Operating time 3.5 3.5 20—80 engine, s

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For comparison: in Germany the closest attention was paid to the development of rocket weapons from the late 1920s to the early 1930s. At the Kummersdorf artillery range in early December 1934, two successful launches of the A2 rocket were carried out, during which it was possible to reach a height of 2200 m. At the same time, work was underway to create a large engine with 1000 kgf thrust and an operating time of 45 seconds. In 1939, the main activities of the Peenemünde Rocket Center were approved in order to develop:

LRE with a thrust of up to 1500 kg for anti-aircraft missiles and short-range missiles;

LRE up to 25,000 kg for ballistic missiles;

missile control and guidance systems;

fuel systems for ballistic missiles;

LRE for rocket fighters;

LRE for a short-term increase in the speed of aircraft in flight;

launch boosters for aircraft;

preparation for mass production of missiles.

Between 1937 and 1940 more than 550 million marks were invested in the Peenemünde Rocket Center.

10X

Work on missile weapons projects, including cruise missiles, was resumed in the Soviet Union only after intelligence began to report to the country's top leadership about a top-secret weapon that the Germans had acquired — a cruise missile. The combat launch of the first ten cruise missiles against targets in England took place at dawn on June 13, 1944, the launch was carried out from ground-based launchers. By June 29, the number of rockets launched from catapults reached 2000, and the first combat launch of a rocket from a He 111 carrier aircraft took place on July 7. German propaganda during radio broadcasts on June 23, 1944 launched the use of the term Uÿ (Megre! - spezma ÿe - "weapon of retaliation"). At Hitler's direction, the name Uÿ (V-1) was made official for the cruise missile from July 4, 1944;

It turned out that the Luftwaffe, on the basis of preliminary studies carried out in the late 30s. (that is, at that time

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when the leading employees of the Soviet RNII were repressed), began in 1940 the development of a cruise missile with a pulsed air-jet engine (PUVRD).

By the way, the Germans were not pioneers in the field of development of PuVRD. In 1865, the French scientist and inventor Ch. de Louvrier developed a project for a jet aircraft "Aeronava" with a jet engine, which was a prototype of a modern air-jet engine. The intermittent combustion of the supplied fuel made it possible to limit the pressure in the combustion chamber to 5–6 atm and, in contrast to the ramjet, provided some thrust during takeoff. It was, at its core, a pulsating jet engine. A more advanced aircraft project (“Improved Aeronautics System”) was developed in Russia in 1867 by N.A. Teleshov, who planned to install a PUVRD on the aircraft, which differed from the de Louvrier engine in that fuel vapors had to be mixed with air even before entering the combustion chamber. For this, a special device such as a modern carburetor was provided.

In 1906, Russian engineer V.V. Karavodin patented “Apparatus for obtaining a pulsating gas jet of significant velocity due to periodic explosions of combustible mixtures” (privilege no. 15375), and in 1908 he built a gas turbine with a pulsating chamber and successfully tested it. A year after the work of V.V. Karavodin, the German researcher Barbetzat conducted research on the distribution of pressure during pulsating combustion, discovered and described the principle of self-ignition in a PUVRD. In the same year, the researcher Marconnet suggested using this engine for an aircraft and received a patent for this device. In GIRD in the 30s. the 3rd brigade, headed by Yu.A. Pobedonostsev.

And only in 1935, the German Paul Schmidt, together with Professor G. Madelung, proposed a project for a glide bomb equipped with a pulsating jet engine. The Luftwaffe, however, rejected the project at the time as "technically dubious and uninteresting from a tactical point of view." But the work of the late 30s. nevertheless led to the creation of the V-1, equipped with the Av 014 Av 014 PUVRD company.

In the Soviet Union, work on PUVRD was resumed in 1941-1942, he worked in this direction, being in

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In addition, the deputy head of CIAM, Professor Boris Sergeevich Stechkin, who was the creator of the theory of the air-jet engine. Several versions of the PUVRD were developed, one of which, the US (Stechkin accelerator), was intended for aircraft. The US was supposed to be installed on Tu-2 and Pe-8 aircraft. The Pe-8 heavy bomber was to be equipped with twelve such boosters, six on each wing console. But in 1943, after the release of B.S. Stechkin from the conclusion, the work on the US was finished.

Since 1942, a group of specialists led by Vladimir Nikolaevich Chelomei has been developing the PuVRD at CIAM. After it became known about the use by the Germans of a new weapon (V-1), the State Defense Committee set the task of creating such a weapon. Therefore, at the end of the summer of 1944, under the leadership of V.N. On October 19, 1944, People's Commissar for Aviation Industry A.I. Shakhurin appointed V.N. Chelomey as the chief designer and director of plant No. 51 of the NKAP, which was supposed to start serial production of the KR 10X. Before the beginning of 1945, it was possible to build the first prototype of the KR 10X and to carry out official tests of the D-3 engine at TsIAM. Already on February 5, 1945, the first serial 10X was rolled out of the assembly shop. In total, nineteen vehicles were manufactured, seventeen of which were sent for flight tests. |

Pe-8 and Yer-2 bombers were chosen as carriers of the CD. Factory flight tests began on March 20, 1945 in Central Asia (Jizzakh). At the first stage, there was

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checking the operation of the suspension devices on the Pe-8, dropping the 10X and the operation of its engine and mechanisms at the time of separation from the carrier aircraft. The projectile was dropped at an altitude of 2000 m, after which, having switched to level flight, 10X flew at a given altitude along a course set on the ground. Of the twenty-two missiles dropped, only six successfully went into independent flight.

At the next stage, the main characteristics of 10X were determined and the operation of their units was checked. Of the same number of dropped machines, twelve have already gone over to independent flight. The obtained speed up to 600-620 km/h and range up to 240 km corresponded to the calculated data.

At the third stage, ground tests were carried out, checking the accuracy of the missiles hitting the target and the effectiveness of their warheads. Of the four 10X apparatuses supplied with explosives, three performed the assigned task satisfactorily. The force of the explosion turned out to be equivalent to the force of an explosion of an aerial bomb weighing 2000 kg. To determine the accuracy of shooting, 18 missiles were launched. However, only six managed to reach the target, five of which hit a given square measuring 20 x 20 km, located at a distance of 170 km from the drop point. The reason for the failures was partly the harsh climatic conditions: the air temperature reached plus 60-65 °C, dust and sand clogged the air ducts and, getting into the autopilots, put them out of action. Flight tests were completed on July 25, 1945. Of the 66 tested missiles, 44 passed to independent flight, and in 24 cases the requirements for range were met and in another 20 - for the course. In total, before the end of World War II, 300 10X machines were built.

Characteristics of 10X: power plant - 1 PuVRD D-3 with a thrust of 310 kgf, wingspan - 6.0 m, length - 8.0 m, maximum body diameter - 1.05 m, take-off weight - 2130 kg , warhead weight - 800 kg, maximum speed - 600 km / h, range - 300 km.

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